Team Performance and Error Management in Chinese and American Simulated Flight Crews: The Role of Cultural and Individual Differences

Donald D. Davis, Janet L. Bryant, Lara Tedrow, Ying Liu,
Katherine A. Selgrade, and Heather J. Downey

Organization Research Group
Department of Psychology
Old Dominion University
Norfolk, Virginia
dddavis@odu.edu

Report prepared for
National Aeronautics and Space Administration—Langley Research Center
(Grant Number NAG-1-230)
April 1, 2005

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACKNOWLEDGEMENTS

Thanks to Paul Schutte for suggestions during the design of the research and creation of the scenarios as well as for support throughout this project. Thanks to Kari Strobel, Michael Mihalescz and Rebecca Vandever for help in collecting the data and creating the data bases. Thanks to Katherine Fodchuk for help in preparing the final report. We are grateful for all of their contributions.

Team Performance and Error Management in Chinese and American Simulated Flight Crews: The Role of Cultural and Individual Differences

Abstract

This report describes results of a study conducted for NASA-Langley Research Center (NASA-LARC; Grant Number NAG-1-2303). This study is part of a program of research conducted for NASA-LARC that has focused on identifying the influence of national culture on the performance of flight crews. We first reviewed the literature devoted to models of teamwork and team performance, crew resource management, error management, and cross-cultural psychology. Davis (1999) reported the results of this review and presented a model that depicted how national culture could influence teamwork and performance in flight crews.

The second study in this research program examined accident investigations of foreign airlines in the United States conducted by the National Transportation Safety Board (NTSB). The ability of cross-cultural values to explain national differences in flight outcomes was examined. Cultural values were found to covary in a predicted way with national differences, but the absence of necessary data in the NTSB reports and limitations in the research method that was used prevented a clear understanding of the causal impact of cultural values. Moreover, individual differences such as personality traits were not examined in this study. Davis and Kuang (2001) report results of this second study.

The research summarized in the current report extends this previous research by directly assessing cultural and individual differences among students from the United States and China who were trained to fly in a flight simulator using desktop computer workstations. The research design used in this study allowed delineation of the impact of national origin, cultural values, personality traits, cognitive style, shared mental model, and task workload on teamwork, error management and flight outcomes.

We briefly review the literature that documents the importance of teamwork and error management and its impact on flight crew performance. We next examine teamwork and crew resource management training designed to improve teamwork. This is followed by discussion of the potential influence of national culture on teamwork and crew resource management. We then examine the influence of other individual and team differences, such as personality traits, cognitive style, shared mental model, and task workload. We provide a heuristic model that depicts the influence of national culture and individual differences on teamwork, error management and flight outcomes. The results demonstrate the usefulness of the model for future research.

INTRODUCTION

During the 1970s, researchers found that more than 70% of aircraft accidents involved human error (Helmreich & Foushee, 1993). This finding sparked interest in pilot error research and on ways to reduce such human performance errors. Analysis of documented aircraft accidents led investigators to conclude that the majority of pilot error is not related to pilot proficiency in the technical skills of flying an aircraft. Instead, the primary source of human performance error is breakdown in team communication and coordination (Helmreich & Foushee, 1993). In response to these findings, the aviation community expanded its traditional training of the individual pilot to include psychological training at the level of the flight crew. These new training programs were initially named Cockpit Resource Management and are now known as Crew Resource Management (CRM).

CRM is defined as "using all available resources—information, equipment, and people—to achieve safe and efficient flight operations" (Lauber, 1984). CRM focuses on psychological training in group dynamics, leadership, interpersonal communications, and decision-making (Helmreich & Merritt, 1998).

Research on the effectiveness of CRM demonstrates that training has a positive impact (Helmreich, 1991). Helmreich, Wilhelm, Gregorich, and Chidester (1990) report that CRM training increases the percentage of crews with above average ratings in performance and decreases the percentage of crews with below average ratings. Analysis of cockpit voice recorder transcripts of accidents and incidents finds that crews apply CRM training even when under stress in emergency situations (Helmreich, 1991). CRM is now widely accepted and valued in the aviation community.

With the success of CRM in the United States, it started to be studied in the international aviation community. Airlines from many nations became interested in these programs that were reported to increase safety and efficiency (Helmreich & Merritt, 1998). As a result, CRM training programs developed in the US were exported to other countries. Countries varied in their reaction to CRM concepts. Certain concepts were more easily understood and accepted in some countries than in others. For example, the emphasis in CRM training on the need to be assertive in the cockpit puzzled Korean pilots (Helmreich & Merritt, 1998). New Zealand pilots resisted what was perceived as culturally insensitive training methods and culturally biased presentation of CRM concepts (Scott-Milligan & Wyness, 1987).

The difficulties encountered when transferring CRM training to other nations demonstrate the importance of considering cultural differences in acceptance and implementation of CRM principles. The overseas reaction to these training programs raised questions about the extent to which CRM practices developed in the West, especially the United States, are culturally generalizable to other nations.

In addition to varying degrees of acceptance of CRM across nations, there are differences in crew factor accident rates across nations. Developing nations in Africa, Latin

America, and Asia have accident rates that are up to eight times that of more industrialized nations in Europe, North America, and the Middle East (Weener, 1990). Yet crews from around the world fly in aircraft that are built by the same companies (e.g., Boeing). They also receive similar training in the technical aspects of flight. Thus, despite common equipment and training, airlines around the world do not possess similar safety records. Although disparity in economic development and aviation infrastructure explain a large portion of these differences, cultural factors likely account for additional variability (Helmreich & Merritt, 1998; Phelan, 1994). The influence of national culture in aviation is finally receiving attention it deserves (Federal Aviation Administration Human Factors Team, 1996).

A Culture-Centered Approach to CRM

Human-centered approaches to the design of cockpit instrumentation and procedures and a focus on flight crew interaction and performance have greatly enhanced the safe flight of modern aircraft. Previous work for NASA (Davis, 1999) has discussed the importance of a *culture-centered* approach to human factors for improving CRM and flight safety. The research described in this report used an experiment designed to test a culture-centered approach to human factors.

The culture-centered approach to human factors examines the influence of cultural differences on performance in human-machine systems. Culture may influence performance in numerous ways (Davis, 1998). At the most fundamental level of analysis, definitions of what constitutes good performance may vary. For example, there is wide variation in emphasis on task achievement versus preservation of harmony in interpersonal relationships. In some cultures, task performance is much less important than quality of interpersonal relationships or demonstration of loyalty to the group's leader. Cultures also vary in the manner in which members encode and process performance related information.

Davis (1999) summarizes the relevance of the cross-cultural approach to the study of crew resource management (CRM) and flight crew performance. He integrated the research literatures devoted to team performance, CRM and cross-cultural psychology. He provided a model that describes how twenty-four cultural values may influence CRM and team performance. Davis and Kuang (2000) used this model to evaluate the influence of cultural values on CRM, team performance and the management of errors related to aviation accidents among foreign airlines. Using National Transportation Safety Board (NTSB) accident reports, they found that foreign airlines could be distinguished by using the cultural values of the nation of origin of the flying pilot and nonflying pilot. Moreover, these cultural values were related to CRM behaviors, team performance and management of errors likely to lead to aircraft accidents.

While the results of Davis and Kuang (2000) are encouraging, conclusions regarding the influence of cultural and individual differences on CRM are limited by a lack of research that directly examines these impacts, particularly research that employs experimental controls. Few published research reports directly examine the influence of culture on CRM. Moreover, the data available in NTSB reports often do not provide sufficient information to

identify relevant CRM factors. Furthermore and perhaps most importantly, the data available in NTSB reports do not allow a reliable estimate of the direct influence of cultural values and other individual differences on crew performance.

The research reported here used an experiment designed to test the cultural approach to human factors described by Davis (1999). This experiment had several important features. It used US and Chinese participants assigned to single culture and mixed culture crews to make cultural comparisons of CRM, error management and flight crew performance. We observed, recorded and analyzed CRM behaviors demonstrated by crews participating in a flight simulation. We assessed cultural values and individual differences relevant to CRM, error management and team performance. Figure 1 depicts the heuristic model used to guide this research.

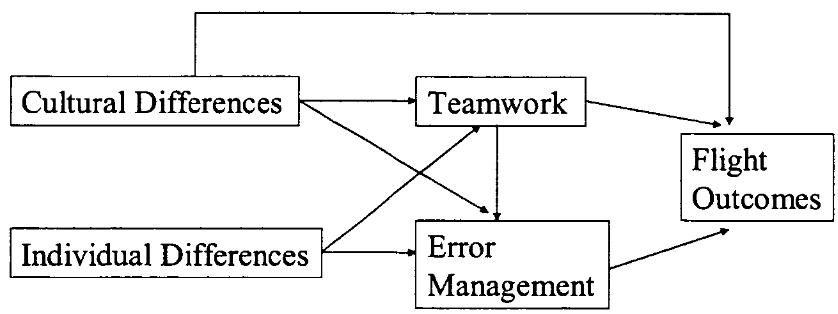


Figure 1. Heuristic Model used to Guide the Research

In the model used to guide this research, flight crew performance has two aspects: teamwork (CRM) and error management. These combine together to influence flight outcomes. Effective teamwork and error management were expected to lead to successful flight outcomes (safe landing of the aircraft). Ineffective teamwork and error management were expected to lead to unsuccessful flight outcomes (crash the aircraft). Teamwork and error management are predicted by cultural differences, such as values for face and harmony, and individual differences, such as personality traits. Cultural differences defined by the cultural makeup of flight crews were also expected to influence flight outcomes. While cultural and individual differences are related to one another and these combinations likely influence teamwork and error management, this was not the focus of the current study and these relationships were not examined.

Error Management

Our approach to error management is taken from the work of Helmreich and his colleagues. Error management is action or inaction taken by the crew that leads to deviation from crew expectations or intentions (Helmreich, Klinect, & Wilhelm, 1999; Helmreich, Wilhelm, Klinect, & Merritt, 2001; Klinect, Wilhelm, & Helmreich, 1999). There are five types of error: intentional noncompliance errors, procedural errors, communication errors, proficiency errors, and operational decision errors. See Table 1 for a list of error types as well as descriptions and examples of each.

Intentional noncompliance errors include conscious violations of regulations and standard operating procedures (SOPs). These can occur when crews choose to bypass or ignore procedures (Helmreich, Wilhelm et al., 2001). Procedural errors include slips or mistakes in the execution of regulations or procedures wherein the intention is correct but the execution is flawed. Communication errors result when information is transmitted or interpreted incorrectly within the cockpit or between the crew and air traffic control (ATC). Proficiency errors occur when there is a lack of knowledge or technical skill. Operational decision errors occur when there is no regulation or procedure to guide actions, and the discretionary decision that is made unnecessarily increases risk.

Crews may manage (or mismanage) errors in at least three ways. First, the crew can respond by trapping the error. This occurs when an error is detected and addressed before it becomes consequential. Second, the crew can exacerbate the error. This involves the detection of the error, but action or inaction by the crew makes the error worse. Third, the crew can fail to respond entirely. In this circumstance, the crew fails to react to the error due to not detecting the error or ignoring the error.

We expected that error management would be related to flight outcomes; crews committing fewer errors were expected to fly their aircraft successfully. This expectation led to the following hypothesis.

> *Hypothesis 1.* Error management will distinguish between safe and unsafe flight outcomes.

We anticipated that error detection and error management, because they are performed jointly by members of the flight crew, should be influenced by the manner in which they work together, that is the quality of their teamwork and CRM.

Table 1. Error Types and Examples

1. *Intentional noncompliance:* Conscious violations of standard operation procedures or regulations.
   - Bypass or ignore procedures
   - Omitting required briefings
   - Omitting required checklists
   - Fail to observe sterile cockpit

2. *Procedural:* Slips, lapses, mistakes in the execution of regulations or procedures.
   - Incorrect entry into flight management computer
   - Unintentionally skipping items on checklist

3. *Communication:* Information is incorrectly transmitted or interpreted within the cockpit crew or between the cockpit crew and external sources.
   - Incorrect communication between crewmembers
   - Incorrect communication between crew and ATC
   - Incorrect interpretation between crewmembers
   - Incorrect interpretation between crew and ATC

4. *Proficiency:* A lack of knowledge or skill.
   - A lack of stick skill
   - A lack of rudder skill

5. *Operational Decision:* Discretionary decisions not covered by regulations and procedures that unnecessarily increase risk.
   - Extreme maneuvers on approach
   - Flying in adverse weather
   - Over-reliance on automation

Note. Based on Helmreich, Klinect, and Wilhelm (1999); Helmreich, Wilhelm, Klinect, and Merritt (2001); Klinect, Wilhelm, and Helmreich (1999).

Teamwork

Teamwork can be defined as the behaviors of team members that give rise to information sharing and activity coordination (Dickinson & McIntyre, 1997). The purpose of teamwork is to achieve team goals. Teamwork directly influences team performance and error management. Some researchers refer to teamwork as team process or group process. In aviation, teamwork has been most commonly treated as part of CRM.

Table 2 lists the components and behavioral examples that comprise the teamwork portion of our model. These components have been adapted by Davis (1999) and Davis and Kuang (2000) from several models of teamwork described in the research literature, in particular the work of Dickinson and McIntyre (1997). Components of teamwork that are in the model include: assertiveness, backup, communication, coordination, decision making, feedback, monitoring, shared mental model, situational awareness, and team leadership. These aspects of teamwork have been shown to be important in CRM and to be sensitive to cultural influence (Davis, 1999; Davis & Kuang, 2000).

Assertiveness. Assertiveness is the ability to initiate action (Swezey, Llaneras, Prince, & Salas, 1991). The absence of assertiveness has been cited as a causal factor in aircraft accidents (Prince & Salas, 1993). Junior crewmembers that do not exhibit assertiveness with their superiors can contribute to accidents by failing to confront senior officers when such confrontations are justified.

Backup. Backup involves members assisting one another when they need help. As in monitoring and shared mental model (see below), this implies that team members must have a good understanding of one another's tasks. Backup is only successful if team members are willing and able to give and seek assistance when needed (Dickinson & McIntyre, 1997). McIntyre and Salas (1995) describe backup as being the key to team performance exceeding the performance of individuals. Teams perform better than individuals doing the same task when team members are willing to assist each other in times of need.

Communication. Communication involves two or more team members exchanging information. It can also include an individual team member relaying information to other members. The purpose of communication is to acquire needed information and to accomplish cooperative tasks. Communication is often used to clarify or acknowledge the receipt of information (Dickinson & McIntyre, 1997). Both task-related and team-related information must be exchanged between team members. Good communication can mean the difference between success and failure in achieving goals. Communication can affect crew performance in the following ways: communication provides information, establishes interpersonal relationships, establishes predictable behavior patterns, maintains attention to task and monitoring, and acts as a management tool (Kanki & Palmer, 1993)

Coordination. Coordination involves the performance of team activities in a manner that encourages team members to act in harmony with each other. Successful coordination results when all components of teamwork are operating together effectively. Individual

actions of each team member combine to produce synchronized and coordinated performance (Dickinson & McIntyre, 1997).

Hackman (1993) describes feeling inspired when watching well-coordinated flight crews in action. He compares the smooth and seamless coordination between crewmembers to a graceful ballet. The period of time between a request and the resulting action is minimal and at times nonexistent for well-coordinated flight crews, much like dancers anticipate and respond immediately to each other's movement.

Decision-making. Decision-making involves the ability to use available information to make sound judgments (Swezey, Llaneras, Prince, & Salas, 1991). Flight crews must make many decisions throughout a flight. Decisions involve assessment of the situation, making a choice among alternatives, and assessing the risk associated with the decision (Orasanu, 1993). Decision-making styles can affect crew performance. Orasanu (1990) found that crews that provide rationales for decisions and that use more options during decision-making perform better than crews that do not exhibit such behaviors.

Feedback. Team members may give, seek and receive feedback from one another. Members give feedback when they provide information regarding another member's performance. Seeking feedback involves asking for input or guidance regarding performance from other team members. Receiving feedback involves accepting information regarding one's performance, whether it is positive or negative. Reviewing decisions and actions of crewmembers can help to optimize flight crew performance (Helmreich & Foushee, 1993). Feedback results from monitoring (described below). Team members, upon recognizing effective performance or ineffective performance by other team members, may share their observations with those team members (McIntyre & Salas, 1995).

Monitoring. Monitoring refers to team members observing the activities and performance of one another while carrying out their own work. Monitoring helps to ensure that things run as expected and that fellow team members are following procedures correctly and efficiently. Monitoring, however, is not meant to be "spying" (McIntyre & Salas, 1995). It only implies that team members should be individually competent and that they should have a good understanding of the tasks of other members of their team so that they can provide backup and feedback (Dickinson & McIntyre, 1997).

Crews, like all teams, should encourage monitoring. When workloads are high, particularly in emergency situations, a crewmember that is less involved with work tasks may be able to notice an error committed by another member who is too busy to notice the mistake. For example, during an emergency situation, the non-flying pilot can notice the appearance of a signal indicating dangerously low fuel levels while the flying pilot is busy handling the initial emergency. Monitoring allows the non-flying pilot to notice this anomaly so that he can now take action to prevent a potential calamity.

Shared Mental Model. Shared mental models (SMMs) consist of attitudes, expectations, knowledge, and behaviors that are shared by team members (Canon-Bowers & Salas, 1990). SMMs are a mechanism for teams to organize information about their task and

each other's contribution to the task. For SMMs to exist, team members must understand the decision-making situation, and they must effectively communicate this understanding to each member of the team. Team members must develop a collective approach to reaching a decision and taking appropriate action. SMMs result from and produce fluent teamwork.

SMMs enhance team performance because they enable a team to analyze tasks accurately with a common set of cognitive categories and language that facilitates information processing. In addition, SMMs help in the coordination of actions and in the changing of behavior to meet task demands (Kraiger & Wenzel, 1997). CRM training seeks to instill in crewmembers a SMM for team performance (Hackman, 1993). SMM may also predict other aspects of teamwork. We discuss this feature below.

Situational Awareness. Situational awareness involves the ability to maintain an accurate perception of one's internal and external environment (Swezey, Llaneras, Prince, & Salas, 1991). Individual situational awareness is necessary for all pilots; effectiveness and safety are compromised if pilots do not practice situational awareness (Prince & Salas, 1993). Situational awareness is equally important for flight crews to enhance team performance and flight safety. Hartel, Smith, and Prince (1991) found that lack of situational awareness was cited most frequently as the causal factor in an analysis of Navy and Marine mishaps. When reviewing Army accidents, Leedom (1990) found that failure to provide information about the situation to other members of the crew is a common cause of accidents.

Team Leadership. Team leadership consists of providing direction, structure and support for team members. Leadership is not limited only to formal team leaders; any team member can provide team leadership. In flight crews, the captain is the formal leader, but members of the crew must also exhibit leadership behaviors. Crews show better performance when captains encourage teamwork that includes leadership by all members of the crew (Ginnett, 1993).

We expected that teamwork behaviors would predict error management and flight outcomes. We were not interested in predicting which specific teamwork behaviors would be most important; therefore we do not make hypotheses concerning the relative importance of teamwork behaviors.

> *Hypothesis 2.* Teamwork behaviors will be related positively to effective error management and successful flight outcomes.

Table 2. Components of Teamwork with Behavioral Examples

Assertiveness

Refers to the ability to initiate action. Behavioral examples include:

Confronts ambiguities and conflicts
Asks questions when uncertain
Maintains position when challenged
Makes suggestions
Advocates a specific course of action
States opinions on decisions/procedures even to higher-ranking crewmembers

Backup Behavior

Involves assisting the performance of other team members. Implies that members have an understanding of other members' tasks. It also implies that team members are willing and able to provide and seek assistance when needed. Behavioral examples include:

Fills in for another member who is unable to perform a task
Helps another member correct a mistake

Communication

Involves the exchange of information between two or more team members using proper terminology. Often the purpose of communication is to clarify or acknowledge the receipt of information. Behavioral examples include:

Verifies information prior to making a report
Acknowledges and repeats messages to ensure understanding
Uses standard terminology when communicating information
Acknowledges communication by others
Uses nonverbal communication appropriately
Provides information that is needed when asked for it
Repeats vital information
Provides information as required
Asks for clarification of a communication
Acknowledges communication (OK, Roger)
Replies with a question or comment
Conveys information concisely

Table 2. Components of Teamwork with Behavioral Examples (continued)

Coordination

Refers to team members executing their activities in a timely and integrated manner. It implies that the performance of some team members influences the performance of other team members This may involve an exchange of information that subsequently influences another member's performance. Behavioral examples include:

Passes performance-relevant data to other members in an efficient manner
Facilitates the performance of other members' jobs.

Decision-making

Refers to the ability to make logical and sound judgments based on available information. Behavioral examples include:

Gathers required information
Identifies alternatives and contingencies
Anticipates consequences of decision
Cross-checks information sources
Uses data to generate alternatives
Evaluates information and assesses resources
Provides rationale for decision

Feedback

Involves giving, seeking, and receiving of information among team members. Giving feedback refers to providing information regarding another member's performance. Seeking feedback refers to requesting guidance regarding performance. Receiving feedback refers to accepting positive and negative information regarding performance. Behavioral examples include:

Responds to other members' requests for performance information
Accepts time-saving suggestions offered by other team members

Monitoring

Refers to observing the activities and performance of other team members. It implies that team members are individually competent and that they may subsequently provide feedback and backup behavior. Behavioral examples include:

Is aware of other team members' performance
Recognizes when a team member performs correctly

Table 2. Components of Teamwork with Behavioral Examples (continued)

Shared Mental Model

Consists of knowledge, attitudes, expectations, and behaviors that are shared by members of a team. Behavioral examples include:

Helps to develop common perception of cockpit environment
Helps to develop common perception of external environment
General activity monitoring

Situational Awareness

Refers to the ability to maintain an accurate perception of the internal and external environment. Behavioral examples include:

Comments on deviations
Demonstrates an ongoing awareness of mission status
Identifies problems
Demonstrates awareness of task performance of self and of others
Recognizes the need for action
Attempts to determine cause of discrepant information before proceeding.

Team leadership

Involves providing direction, structure, and support for other team members. It does not necessarily refer to a single individual with formal authority over others. Several team members can show team leadership. Behavioral examples include:

Explains to others exactly what is needed from them during an assignment
Listens to the concerns of other team members
Specifies tasks to be assigned verbally
Asks for input, discusses problems
Focuses crew attention on task
Provides feedback to other crewmembers about performance
Establishes procedures to monitor and assess the crew
Informs crewmembers of mission progress
Reallocates work in a dynamic situation

Source: Adapted from Davis (1999) and Davis and Kuang (2000).

Culture Differences

With global diffusion of CRM training and its limited success in some nations, it is important to discover the cultural factors that may interact with CRM and, in turn, influence crew performance. The work of Helmreich and his colleagues stands out here (see Helmreich & Merritt, 1998, for a summary). They have reported differences due to national and professional culture in attitudes toward numerous CRM practices. Unfortunately, there is little research examining the influence of specific cultural differences on teamwork practices included in CRM training programs or on flight crew performance.

Helmreich and his colleagues have been responsible for most of the limited work examining the influence of culture on CRM. They developed the Flight Management Attitudes Questionnaire (FMAQ) that includes items that assess Hofstede's (1980) typology of cultural values (Helmreich, Merritt, Sherman, Gregorich & Weiner, 1993). In addition to measuring cultural values, the FMAQ measures pilots' attitudes toward automation, command, communication, organizational climate, rules, stress, and work values (Helmreich & Merritt, 1998). Several differences in attitudes have been found using this measure among flight crews from different nations.

Merritt and Helmreich (1995) found differences between nations regarding attitudes toward command. Pilots from Anglo cultures such as Australia, New Zealand, the USA, and Ireland scored higher on the Command Structure scale of the FMAQ than did pilots from non-Anglo cultures such as Brazil, Cyprus, Morocco, Philippines, and Japan. A high score indicates a preference for flattened command structure; there is less formal distance between the captain and the crew, and there is greater two-way communication. Endorsement of this scale indicates that it is acceptable for crew members to question decisions made by the flying pilot, that the non-flying pilot may assume command of the aircraft under certain circumstances, that the flying pilot should not automatically take physical control of the aircraft, and that more than the flying pilot's technical proficiency is required for successful management of the flight deck.

This difference in orientation toward command can be explained by differences in the values of these national groups. Anglo cultures believe in egalitarianism, whereas many non-Anglo cultures believe that people are not equal, and that relational hierarchies determine one's place in family, clan, work organization, and society. Anglo pilots prefer leaders to consult with them before making decisions and to treat them as equals. Non-Anglo pilots, on the other hand, understand and accept their social position and do not expect to be treated as equals. While Anglo pilots prefer clear and direct communication and believe that every individual has the right to question anyone and anything, non-Anglo pilots find it necessary to use indirect and elaborate communication to honor relationships and maintain group harmony (Merritt & Helmreich, 1995). Differences in orientation to command can be explained by understanding differences in cultural values such as individualism and power distance (discussed below).

In another study relating culture to cockpit crew interactions, Redding and Ogilvie (1984) examined the effects of culture on cockpit communications. When comparing airlines

from different nations, they found that crew members from low power distance countries were less likely to perceive barriers to communication in the cockpit due to status. They also found that individualism is related negatively to perceived conflict. This finding is probably associated with the fact that interpersonal conflict and its negative impact on harmony are more accepted in individualist cultures, hence there is less sensitivity to it.

Sherman, Helmreich, and Merritt (1997) investigated the link between national culture and attitudes toward flight deck automation among 5,879 airline pilots from twelve nations. They found that cultural values were related to reactions to automation. Nations differed in endorsement levels for the eleven items that assessed attitudes toward automation. The average difference in endorsement levels across the eleven items for the twelve nations was 53%. This reflects a significant difference in attitudes toward automation across nations. The greatest differences in attitude were found for preference and enthusiasm for automation. The difference in agreement levels across nations was, on average, four times larger than the difference in agreement levels across different airlines within the same nation. The larger difference across nations belies the belief that common training and experiences produce a universal "pilot culture" that neutralizes the influence of national culture differences.

The patterns of response regarding automation can be explained by national culture. For example, pilots from nations that emphasize autonomy and individualism may be more willing to interact with computers and use them as a discretionary tool. Those from nations that emphasize conservatism and collectivism may be more likely to accept the authority of computers without question. This is critically important in the context of flight crew performance. During a crisis when there might be errors in automation, pilots from individualist cultures may be more likely to override the automation and prevent an accident, whereas pilots from conservative cultures may be less likely to take such action.

Cultural composition of flight crews is relevant to CRM. Crews with members from the same culture (single culture crews) are likely to be able to apply CRM practices more easily because of their shared cultural background. In contrast, crews with members from different cultures (mixed culture crews) are likely to have more difficulty with CRM because of differences in cultural background. For example, different expectations about the importance of deference to those in higher authority will influence assertiveness, feedback and leadership. Language differences may reduce communication frequency. Values regarding the importance of the group will influence willingness to provide backup. In general, crew coordination will be more difficult to achieve in mixed culture crews due to reduced teamwork resulting from cultural differences. These expectations lead to the following hypothesis:

Hypothesis 3. Mixed culture crews will demonstrate less teamwork, less error management and have more unsafe flight outcomes than single culture crews.

We did not have any expectations about the relative performance of the American and Chinese crews in our study, that is, we did not have a basis for expecting members of one group to demonstrate better teamwork than the other. We explore these differences in the cultural composition of flight crews but we do not propose any hypotheses concerning them.

Cultural values have been studied widely. Research examining values related to work and social groups is most relevant for CRM. Hofstede (1980) collected survey data in the 1970s from managers and employees from 53 different national subsidiaries of the IBM Corporation. Hofstede derived four dimensions of national culture: power distance, individualism/collectivism, masculinity/femininity, and uncertainty avoidance. Power distance and individualism/ collectivism are most relevant to CRM.

Power distance. Power distance is the degree to which people with less power expect and accept that the distribution of power is unequal. In high power distance countries, such as Malaysia, Philippines, or Mexico, subordinates are unlikely to question their superiors. In low power distance countries, such as Canada, Denmark, or Austria, there is a preference for consultation regardless of power. Therefore, subordinates feel more comfortable questioning their superiors in these nations. Power distance is important for flight crews because of the power differential between captain and crew. For example, when a captain commits an error, a Canadian crewmember may be more likely to inform him/her of this error than would a Malaysian crewmember.

Individualism/Collectivism. Individualism and collectivism refer to the degree to which individuals are connected to their groups. Loose ties between individuals characterize individualism. In individualist cultures, people are expected to look after themselves. Collectivism is characterized by the integration of people into strong, cohesive in-groups. People in collectivist cultures emphasize group needs over individual needs. In addition, there is a strong inclination in collectivist cultures to maintain harmony among group members. Anglo countries such as Australia and the USA are high in individualism, while Asian and Hispanic countries such as Taiwan and Mexico are low in individualism, that is, high in collectivism (Hofstede, 1980). For flight crews, collectivist crewmembers may have a greater concern for harmony in the cockpit and may be more willing to work together as a team and provide backup to one another. Collectivists may also be less willing to disagree openly with fellow crewmembers about decisions or actions than individualists.

Schwartz (1994, 1999) has also made an important contribution to the cross-cultural study of values. Like Hofstede, Schwartz has collected data from samples throughout the world and examined national differences in cultural values. Based on data from 49 nations, Schwartz has identified seven values that reliably distinguish between cultures. The seven values include: hierarchy, mastery, affective autonomy, intellectual autonomy, egalitarianism, harmony, and conservatism. The following description of these values is based on Schwartz (1999).

Conservatism/Autonomy. A major concern in most societies is how to define the relationship between the individual and the group. This concern focuses on the extent to which individual or group interests take precedence. Some cultures address this problem by viewing the individual as embedded in the collective. In such cultures, meaning is sought largely through social relationships. Therefore, maintenance of social relationships takes priority. Similar to Hofstede's conception of collectivism, Schwartz labels this mechanism conservatism. The label reflects the cultural emphasis on maintenance of the status quo,

propriety, and restraint in one's actions to avoid disrupting the group. In contrast, autonomy represents a different adaptive mechanism. Cultures that hold this value view individuals to be autonomous. Such individuals find meaning in their uniqueness. As a result, individuals are encouraged to express their preferences, traits, behaviors, and other differences. Autonomy may exist in thought (intellectual autonomy) or in feelings and emotion (affective autonomy). Cultures high in intellectual autonomy encourage individuals to pursue their own ideas and intellectual development. Cultures high in affective autonomy encourage individuals to pursue positive, emotional experiences such as pleasure and excitement.

Hierarchy/Egalitarianism. The second concern many societies face is how to preserve social order by guaranteeing responsible behavior on the part of their members. One way to guarantee responsible behavior is to force members to be concerned with the welfare of others and to coordinate their efforts. Hierarchy represents one way to enforce this type of behavior. People are socialized to comply with the rules and obligations associated with their roles (e.g., daughter, worker, manager, government official). Cultures that employ hierarchy for such social control emphasize the legitimacy of unequal distribution of power, roles and resources (e.g., social power and wealth), as in Hofstede's concept of power distance. Egalitarianism is another way to encourage responsible behavior. This mechanism socializes members of society to recognize one another as moral and social equals who share basic interests as human beings. In this case, members internalize a commitment to voluntary cooperation and a concern for everyone's social welfare. With egalitarianism, cultures emphasize transcendence of self-interests in favor of promoting the welfare of everyone in society.

Mastery/Harmony. The third concern that societies must confront is their relationship with the natural and social world. Cultures may encourage control and exploitation or may instead foster acceptance. The value of mastery encourages individuals to bend the natural and social world to one's will. In these cultures, one advances through self-assertion and pursuit of personal interests. The value of harmony encourages individuals to accept the world as it is and to try to peacefully fit into the social and natural world.

Cultural values may exert their influence on individuals singly as well as jointly. For example, power distance and individualism are negatively correlated (Hofstede, 1997). Many countries that are high in power distance are low in individualism. In other words, countries that are high in power distance are also likely to be more collectivist. Countries that are low in power distance are likely to be more individualist. The implication of this correlation is that these values exert joint influence.

For Schwartz's values, harmony opposes mastery; conservatism opposes intellectual and affective autonomy; egalitarianism opposes hierarchy. Egalitarianism, both forms of autonomy and mastery tend to correlate with each other, as do harmony, conservatism, and hierarchy.

Cultures evolve values that help members to survive in their local environment. Cultural values, therefore, continue to be practiced to the degree that they enhance success and survival. In other words, the values held in each culture are suitable for it. Different

cultures, because they exist in different environments, evolve different values that may be equally effective. We expected that cultural values would influence teamwork in flight crews, but we did not have any expectations about their relative influence or the direction of expected relationships. We expected that members of single culture teams, because they shared the same culture, would use their shared values to enhance team work and performance. In mixed culture crews, on the other hand, differences in cultural background and values would diminish teamwork and performance. We explore the impact of cultural values in combination with the cultural differences imposed by the experimental design.

Hypothesis 4. Cultural values will be related to teamwork behaviors, error management and flight outcomes.

Individual Differences

In addition to differences in cultural values, individuals may vary in other ways. We studied two other forms of individual difference: personality traits and cognition.

Personality has a long history of study in cross-cultural psychology. This interest has derived from the belief that personality traits provide a fundamental means to explain differences in human behavior. Over the years many models of personality have been proposed and studied. In recent years, researchers have come to accept a single, five factor model of personality that appears to subsume most other models of personality and appears to be universal (McCrae & Costa, 1997). The five factors include (1) extroversion, (2) neuroticism, (3) agreeableness, (4) conscientiousness, and (5) openness. This five factor structure has been validated in numerous cultures throughout the world (McCrae, Costa, Del Pilar, & Rolland, 1998). The five-factor model of personality has been shown to predict work performance and the type of team behaviors important in CRM (Barrick & mount, 1991; Barrick, Stewart, Neubert, & Mount, 1998).

In addition to universal models of personality such as the five-factor model, researchers have suggested that indigenous theories of personality are important as well. Indigenous theories of personality focus on personality traits that may be found only in specific cultures. Indigenous personality theories explain important sources of variation because culture and personality co-evolve to mutually constitute and influence development of one another (Markus and Kitayama, 1998). Because Chinese subjects comprise half of our sample, Chinese psychology is very important in our research. Much work has been done to develop an indigenous psychology of Chinese people (Bond, 1996; Ho, 1998).

In the area of Chinese personality, the work of Cheung and her colleagues stands out (Cheung, Song, Zhang, and Zhang, 1996; Cheung, Leung, Zhang, Sun, Gan, Song, & Xie, 2001). Cheung and her colleagues have developed a model and measure of personality that is relevant to Chinese people. The model reflects the influence of traditional Chinese culture, particularly Confucianism; their measure assesses these unique traits. Examples of Confucian influenced traits include harmony, face, renqing, and family orientation. The traits assessed in Cheung's research show only partial overlap with the traits measured in the five-factor model, documenting the need to include indigenous as well as universal measures of

personality in research involving Chinese participants. We employ portions of Cheung's model of Chinese personality in our research to broaden study of the influence of personality traits on crew performance.

We used the five-factor model of personality and Cheung's model of indigenous Chinese personality to study the influence of personality traits on teamwork and error management. Like cultural values, personality traits may be equally effective within their own culture but may come into conflict when members of different cultures work together. We intended to explore the role of personality without expectations about the relative importance of specific traits. As a result we did not have hypotheses about direction or magnitude of the relationships between personality traits and criteria in our research.

> *Hypothesis 5.* Traits representing the five factor model of personality and the model of indigenous Chinese personality will be related to teamwork and error management.

Cognitive processing provides another individual difference that may influence teamwork and crew performance. Cultural differences in cognitive processing emerge as a result of differences in shared experiences, resources, challenges for survival, and so forth, resulting in different "cultural lenses" that shape the manner in which cultural members perceive and process sensory information (Klein, 2003). As a result of these cultural experiences, individuals create mental categories and rules that link these categories together that may have specific cultural meaning. While cognitive processing is universal, the contents and manner of cognitive processing vary across cultures.

Cultural differences exist in cognitive style. Cognitive style refers to the "how" of information processing rather than the "how much," which is addressed by traditional ideas about intelligence or cognitive ability. Cognitive styles represent ways that members of a culture evolve for problem solving and dealing with problems of daily life (Berry, Poortinga, Segall, & Dasen, 2002). The study of cognitive style considers the ecological context for cognitive processing. For example, Americans emphasize differentiation in thinking—comparison of opposites and selection of one choice as the correct position—while Chinese emphasize dialectical thinking—seeking reconciliation between opposites (Peng & Nisbett, 1999). The emphasis by Americans on parts rather than wholes likely results from the historical influence of Greek thought, especially Aristotelian logic. The emphasis by Chinese on wholes rather than parts derives from the influence of five-phase theory, yin-yang balance and other aspects of Taoist thought in traditional Chinese culture.

The most influential theory of cognitive style in cross-cultural psychology was developed by Witkin and his colleagues (Witkin & Berry, 1975: Witkin, Dyk, Paterson, Goodenough, & Karp, 1962; Witkin, Goodenough, & Oltman, 1979), who discovered a cognitive style they labeled field-dependence/field-independence (FDI). Interestingly, Witkin's initial ideas for this construct were stimulated by his study of perceptual abilities among pilots in training. FDI was used to explain differences in reliance upon context when processing perceptual cues. Those who are field independent rely more on internal cues when processing perceptual information, while those who are field dependent rely more on situational cues when processing perceptual information. Subsequent study by Witkin and his

colleagues discovered patterns of other characteristics that are related to this difference in cognitive style. Those who emphasize field independence also are more likely to prefer autonomous functioning and be less socially engaged, in contrast to those who emphasize field dependence, who prefer interdependent functioning and social engagement.

FDI varies across cultures (Berry, 1991). Cultural differences in FDI are correlated with ecological variation. Berry et al. (2002, p. 139) point out some of the correlates of FDI. Correlates of field independence include: hunting and gathering subsistence pattern, nomadic settlement pattern, low population density, nuclear family type, loose political/social stratification, assertive socialization, high Western education, and high wage employment. In contrast, correlates of field dependence include: agricultural subsistence pattern, sedentary settlement pattern, high population density, extended family type, tight political/social stratification, compliant socialization, low Western education, and low wage employment. One would expect Americans to be more field independent and Chinese to be more field dependent.

Like cultural values and indigenous personality traits, field independence and field dependence may be equally effective in different cultures. We intended to explore the influence of FDI in teamwork and error management. As a result we did not have hypotheses about direction or magnitude of the relationships between FDI and criteria in our research.

Hypothesis 6. FDI will be related to teamwork and error management.

Mental models represent another important aspect of cognition. Mental models represent a mechanism with which humans generate internal descriptions and understandings of the external environment that allow predictions of and adaptations to environmental states (Rouse & Morris, 1986). Mental models make information processing more efficient by focusing on relevant information and screening out irrelevant information in order to reduce information overload. Cannon-Bowers and Salas (1990) were the first to extend this idea to team performance. The idea of a shared mental model (SMM) refers to the observation that individuals that work together in teams form over time a shared cognitive model of the tasks performed by the team and salient characteristics of the environment which leads to coordination and smooth interaction observed in effective teams. Because team members understand the role of each team member and each of their task demands, a SMM allows them to anticipate and respond to the actions of others. Increased communication associated with the SMM may explain in part enhanced team coordination (Stout, Cannon-Bowers, Salas, & Milanovich, 1999). One of the purposes of flight training is to instill a mental model of flight and CRM that is shared by all crew members. Preflight briefings aim to do this as well.

We discussed above how SMMs are a component of teamwork. SMMs as shared cognition may also predict other aspects of teamwork, such as monitoring, backup, feedback, communication, and decision making. This impact should in turn enhance error management and crew performance, thus yielding the following hypothesis,

Hypothesis 7. Possession of a shared mental model will be positively related to teamwork and effective error management.

Cognitive workload is the final aspect of cognition studied in our research. Cognitive workload has received much attention in the study of individual and team performance in aviation psychology. Pilot workload is often defined as an intervening variable, similar to attention, which influences one's ability to tune into and deal with changes in the environment (Kantowitz & Campbell, 1996). Stress usually accompanies increased workload with predictable consequences—increased workload typically diminishes performance in individuals and teams. Due to the extra demands that teams face to maintain coordination, stress resulting from increased workload may be greater in teams than in individuals performing similar tasks (Morgan & Bowers, 1995). This effect may be most pronounced in mixed culture teams where cultural differences place greater strain on the ability to coordinate individual tasks. On the other hand, there is some evidence that teams may compensate for increased workload in some situations. For example, teams may be better able to monitor complex, dynamic situations than individuals (Morrissette, Hornseth & Shellar, 1975).

The mixed results reported in the literature make it difficult to form hypotheses about the influence of team workload. We explored the impact of team workload on teamwork and error management without expectations regarding the direction or magnitude of these relationships, thus yielding the following hypothesis.

Hypothesis 8. Team workload will be related to teamwork and error management.

RESEARCH METHODS

Participants

Participants were undergraduate and graduate students from Old Dominion University, Eastern Virginia Medical School and The College of William and Mary. Participants were male and at least eighteen years of age. Chinese participants came from the People's Republic of China, Hong Kong, or Taiwan. American participants were native to the United States.

A total of two hundred and six participants were recruited for the study. Six participants voluntarily left the study before advancing to the experiment phase. Information for four individuals was deleted due to missing data. The final sample size consisted of one hundred ninety-six participants: ninety-eight Americans and ninety-eight Chinese. One-way Analysis of Variance (ANOVA) was used to determine if the American and Chinese samples were equivalent. Table 3 summarizes the results of these analyses. In addition to the information summarized in Table 3, other demographic information was gathered (see Appendix A). However, this additional demographic information was not used to determine group differences. Power for all analyses was calculated individually and is reported at the beginning of the results section. Significant between-group differences were found with regard to age, $F\,(1, 192) = 10.83, p < .001$, power = 1.00; year in school, $F\,(1, 188) = 36.10$, $p < .001$, power = .82; prior work team experience, $F\,(1, 192) = 4.60, p < .05$, power = .86; and prior simulator experience, $F\,(1, 192) = 11.42, p < .001$, power = 1.00. Chinese participants were primarily older, had less work team and simulator experience, and were more likely to be graduate students than American participants. No significant between-group differences were found for prior or current military experience $F\,(1, 192) = .06, p = .81$, power = .00; and program of study $F\,(1, 185) = .31, p = .58$, power = .15.

Table 4 presents experience speaking English and living in the United States for Chinese participants. Chinese participants had an average of 7.77 years experience speaking English, with a range of less than one year to twenty-five years. Chinese participants spent an average of 2.28 years living in the United States, with a range of less than one year to twenty years. The average Test of English as a Foreign Language (TOEFL) score was 569 out of a possible 677. Their scores ranged from 220 to 667.

Research Design

Participants were grouped into two person teams. We compared performance of single culture and mixed culture teams. Single culture teams consisted of two members of the same national origin, one member randomly assigned to the role of pilot and the other randomly assigned to the role of copilot. To compare differences between cultures, fifty American teams were compared to fifty Chinese teams. We also used Chinese and American participants to create fifty mixed culture teams. Mixed culture teams consisted of one American and one Chinese participant. For mixed culture teams, culture was counter balanced so that half of the teams had a Chinese pilot and half had an American pilot. All participants completed a same culture condition, and half of the American and half of the

Chinese participants also completed a mixed culture condition. For those individuals who completed two experimental sessions, we counterbalanced order of scenario presentation and role. Therefore, participants who completed two experimental sessions served as both pilot and copilot; they never repeated the same role. We then compared performance of single culture and mixed culture teams.

Training Program. Six graduate students in the industrial/organizational psychology Ph.D. program were trained to fly Microsoft Flight Simulator Professional 2000 and served as flight instructors. All instructors were required to become familiar with the fundamentals of flight and to pass the Microsoft Flight Simulator 2000 proficiency test. This proficiency test requires the successful completion of a flight including takeoff and landing while maintaining the proper altitude, speed, and heading.

We developed a training program and a training manual to teach participants how to fly a Cessna 182S airplane using Microsoft Flight Simulator. The lessons from the software package and accompanying manual were used as the foundation for the training program. Additional information not covered by the software was included to ensure participant understanding and ability to complete the experimental scenarios. This additional information included training in use of a flight computer to calculate fuel levels, use of GPS as a navigational system, bad weather flight instructions, air traffic control (ATC) communications, and an explanation of pilot and copilot responsibilities. This information was adapted primarily from the Microsoft Flight Simulator 2000 Pilot's Handbook (1999).

A training manual was created to explain the information presented in the training program. Resources used to develop the training manual included a guide to light airplane essentials (Craig, 1997), a private pilot handbook (Machado, 1996), and the Aircraft Owners and Pilots Association (AOPA) website (www.aopa.org). The training program was revised after pilot testing two groups of trainees. Each participant received a copy of the training manual at the beginning of his training. A trainer script was also developed to ensure consistency of training procedures and content across flight instructors. A copy of the trainer script can be found in Appendix B. Appendix C contains a copy of the training manual.

Table 3. *Demographic Differences for Participants*

Variable	American	Chinese	F	*p*	Range
Number of Participants (*N*)	98	98			
Age (years) (*M*)	24.98	27.91	10.83	.001	17 - 45
Number of Siblings (*M*)	1.86	1.76	.23	.630	0 - 6
Years Driving Experience (*M*)	8.45	3.21	49.87	.000	0 - 35
Prior Work Team Experience[a] (*M*)	.46	.31	4.60	.030	
Prior Military Experience[a] (*M*)	.15	.13	.06	.810	
Prior Simulator Experience[b] (*M*)	1.23	1.06	11.42	.001	
Year in School (*M*)	4.19	6.19	36.10	.000	
Freshman (*N*)	5	7			
Sophomore (*N*)	10	0			
Junior (*N*)	26	3			
Senior (*N*)	28	3			
Graduate (*N*)	16	71			
Unknown (*N*)	9	11			
Program of Study			.31	.580	
Business & Public Administration (*N*)	11	18			
Computer Science/IT (*N*)	29	24			
Engineering (*N*)	13	21			
Education (*N*)	3	4			
Liberal Arts (*N*)	11	2			
Sciences (*N*)	28	20			
Other (*N*)	2	0			

Note. M refers to reported mean. *N* refers to actual number of responses. [a] Response scale 0 = no, 1 = yes. [b] Response scale 1 = no, 2 = yes.

Table 4. *Demographic Information for Chinese Participants*

Variable	Mean (SD)	Range
Years speaking English	7.77 (6.10)	0 – 25
Years living in the USA	2.28 (3.51)	0 – 20
Total TOEFL score	569.00 (93.43)	220 – 667

Measures

Measures of individual differences, team behaviors, error behaviors, and flight outcomes were used in this study. Individual difference measures included a demographic survey, two personality inventories (Chinese Personality Assessment Inventory, NEO-Personality Inventory- Revised), four measures of cultural values (Flight Management Attitude Questionnaire, Individualism/Collectivism Survey, Power Distance Survey, and Schwartz Cultural Value Survey), and a test of cognitive style (Embedded Figures Test). Participants also received two flight knowledge tests: one prior to training (Flight Knowledge Pre-test) and one after training (Flight Knowledge Post-test) to provide a manipulation check of training effectiveness. Following each flight scenario, participants completed two instruments to assess cognition during the experimental flight. These included a measure of task shared mental model (SMM) and a workload measure (NASA Task Load Index). A behavioral checklist was developed and used to measure team behaviors, error behaviors, and flight outcomes. Team behavior criteria were adapted from Dickinson and McIntyre's (1997) team performance model and from crew resource management behaviors identified by Davis (1999). Error behavior criteria were based on work by Helmreich, Klinect, and Wilhelm (1999).

In the following sections we describe each of the measures we used. We report reliability information published in the research literature for each instrument. In the results section below, we report reliability information calculated for participants in our study.

Personality Measures

Chinese Personality Assessment Inventory (CPAI). The CPAI Form B was developed by Cheung and colleagues (1996) and was revised as CPAI Form C in 2000 (Cheung, et al., 2001). The CPAI Form C was used in this study. The measure consists of constructs that reflect Chinese culture as well as scales examining personality constructs commonly found in English-language personality tests. Chinese constructs are based on adjectives and self-descriptions associated with daily life in China. We did not use the entire CPAI because of its length and its redundancy with several scales measured with the NEO Personality

Inventory, which we also used and which is discussed below. We instead selected the following constructs from the CPAI Form C for use in this study because they are emphasized in Chinese culture and because they are relevant to our experimental manipulation: Harmony, Leadership, Face, Renqing, Family Orientation, Flexibility, Modernization, Adventurousness, and Internal/External locus of control. There were one hundred thirty-five items representing these nine constructs in our shortened version of the CPAI. Participants responded to each item by answering yes (indicating the item was true for them) or no (indicating the item was not true for them). Higher scores indicate having more of each trait. Traditionally, Chinese have higher levels of harmony, face, renqing, and family orientation (Cheung et al., 2001). Chinese have traditionally had lower scores on leadership, flexibility, and modernization (Cheung et al., 2001). We calculated reliabilities for each scale using our sample. Coefficient alpha values were .61 for the harmony scale, .68 for the leadership scale, .68 for the face scale, .50 for the renqing scale, .63 for the family orientation scale, .74 for the flexibility scale, .58 for the modernization scale, .57 for the adventurousness scale, and .61 for the internal/ external locus of control scale. One item was removed from each of the renqing, adventurousness, and internal/external locus of control scales because the item was negatively correlated with the remaining items for that scale. Deleting the item with the negative item-total correlation improved reliability for these scales. Cheung et al. (1996) report average Cronbach alpha coefficients for personality scales of the CPAI of .69 for their Chinese sample and .70 for their Hong Kong sample. They note that their renqing scale had the lowest alpha, .55 for the Hong Kong sample and .58 for the Chinese sample. Table 5 provides a description of CPAI factors. See Appendix D for the complete measure.

NEO-Personality Inventory-Revised. The NEO Personality Inventory-Revised (NEO-PI-R) is an inventory that assesses the five-factor model of personality (Costa & McRae, 1992). The five-factor theory on which the NEO is based is useful in understanding a variety of personality constructs and helpful in explaining phenomena of various cultures (Piedmont & Chae, 1997). Costa and McCrae (1997) state that the NEO has been scientifically evaluated for "its comprehensiveness, universality, and practical relevance." The five factors are Neuroticism, also known as Emotional Stability (N), Extraversion (E), Openness to Experience (O), Agreeableness (A), and Conscientiousness (C). Each factor consists of six subscales or facets. The NEO-PI-R contains two hundred forty items. Table 6 provides a description of each factor and its corresponding facets. Participants responded to each item on a scale of one (strongly disagree) to five (strongly agree). Higher scores indicate an individual has more of that trait. Coefficient alpha measures of internal consistency for the self-rating form range from .56 to .92 (Costa, 1996). We calculated reliabilities for each factor using our sample. Coefficient alphas were .86 for N, .87 for E, .88 for O, .81 for A, and .89 for C. The NEO is a copyrighted instrument, so we do not include a copy of it in this report.

Table 5. *CPAI Factors*

Factor	Description
Adventurousness	Measures the willingness to take chances and attempt new endeavors.
Face	Measures an image of self, which is defined in terms of approved social attributes.
Family orientation	Measures the role of the family and kin in the core of a culture's social, cultural, and economic activities.
Flexibility	Measures ability to acknowledge and deal with unpredictable events and differing points of view.
Harmony	Measures one's inner piece of mind, contentment, and interpersonal harmony.
Internal/External Locus of Control	Measures acknowledgment of the self for individual accomplishments (internal) versus acknowledgement of the environment's role in individual accomplishments (external).
Leadership	Measures providing direction, structure, and support for other team members.
Modernization	Measures attitudes toward traditional Chinese values in the areas of family relationship, materialism, hierarchical order, rituals, and chastity.
Renqing	Measures social favors that are exchanged in the form of money, goods, information, status, service, and affection according to an implicit set of rules.

Table 6. *NEO-PI-R Factors*

Factor	Description	Facets
Agreeableness	Measures a person's attitudes towards other people.	Trust; Cooperation; Morality; Modesty; Altruism; Sympathy
Conscientiousness	Measures how organized, motivated, and thorough an individual is in life and in pursuing goals	Resourcefulness; Achievement Striving; Orderliness; Self-Discipline; Cautiousness; Sense of Duty
Extraversion	Measures the energy and enthusiasm a person has, especially when dealing with people.	Friendliness; Activity Level; Gregariousness; Cheerfulness; Excitement Seeking; Assertiveness
Openness to experience	Measures an individual's seeking and appreciation of experience for its own sake.	Imagination; Artistic Interests; Emotions Adventurousness; Intellect; Liberalism
Neuroticism/Emotional Stability	Measures the different ways people have of reacting emotionally to pressure and stressful circumstances.	Anxiety; Vulnerability; Self-Consciousness; Immoderation; Anger; Depression

Cultural Values Measures

Flight Management Attitudes Questionnaire. The Flight Management Attitudes Questionnaire (FMAQ) is a survey developed to assess attitudes toward teamwork in aviation (Helmreich & Merritt, 1998; Merritt, 1996). Our study used the international version of the FMAQ Form 2.0, which is intended for cross-cultural research (Sexton, Wilhelm, Helmreich, Merritt, & Klinect, 2001). The FMAQ 2.0 includes sixty-six items related to culture, safety, training, compliance, checklists, managerial issues, and organizational issues (Merritt, Helmreich, Wilhelm, & Sherman, 1996). We used only the Work Values Scale of the FMAQ because it was the scale most appropriate to our student sample; the remaining scales contain items that are applicable and relevant only to professional pilots. Working back and forth between principal components factor analysis and scale reliability analyses, we identified four factors within the Work Values Scale. The Work Values Scale was scored on a scale of 1 "of very little or no importance" to 5 "of utmost importance." High scores on the

FMAQ Work Values Scale indicate greater importance of each factor. Scores are standardized within subjects for analysis, according to procedures outlined by Merritt (1996). The FMAQ is not a standardized cultural assessment tool because it has never been validated on a large sample of countries (A. Merritt, personal communication, August 19, 2003). Further, Merritt's (1996) work did not include students or a Chinese sample. Therefore, we created FMAQ factors from our data by working back and forth between factor and reliability analyses. Table 7 provides a description of the FMAQ factors contained in the Work Values Scale created for this study. The four factors that we identified are unique to this sample and are not discussed in the existing literature on FMAQ. Hence, there are no published reliabilities for these scales. We report reliabilities calculated from this sample. The Work Satisfaction factor has a coefficient alpha of .73, Work Structure, .65, Interpersonal Relationship Quality, .61, and Task Variety and Challenge, .52. See Appendix E for the complete measure.

Individualism/Collectivism (IC) Scale. Those with strong individualist values are typically self-oriented. They perceive themselves as individual actors and place their personal interests above those of the collective society. By contrast, members of strongly collectivist societies are socially oriented. They place the interests and well being of their groups ahead of individual interests. Collectivist societies also place great value on interpersonal relationships, group welfare, and equality. We used a scale developed by Liang (1999) to assess IC. Liang (1999) validated this scale in a Chinese sample. His research was based on the work of Chen, Meindl, and Hunt (1997), Triandis (1995), and Wagner (1996). The IC scale contains seven items. Participants responded to each item on a scale of one (strongly disagree) to five (strongly agree). High scores indicate a focus on collectivism. Coefficient alpha for the IC, as calculated using our sample, was of .75. See Appendix F for the complete measure.

Power Distance (PD) Scale. Power distance has been defined as the degree to which less powerful members of a given society expect and accept that power is distributed unequally (Hofstede & Bond, 1984). Liang (1999) also constructed the PD scale for use among Chinese. This scale is based on work by Earley and Erez (1997). There are ten items in this scale. Participants responded to each item on a scale of one (strongly disagree) to five (strongly agree). High scores indicate high power distance. Coefficient alpha for the PD scale, as calculated using our sample, was .72. See Appendix G for the complete measure.

Table 7. *Flight Management Attitudes Questionnaire Factors*

Factor	Description
Interpersonal Relationship Quality	Measures the extent to which individuals seek warm relationships with coworkers and supervisors.
Task Variety and Challenge	Measures the extent to which individuals seek variety and challenge in their work.
Structure	Measures the extent to which individuals seek structure and predictability in their jobs.
Work Satisfaction	Measures the importance of elements associated with work, including advancement opportunities, employment security, desirable living area, opportunity for high earnings, time for family, and cooperative working relationships.

Schwartz Cultural Values Survey (SVS). The SVS measures cultural values, such as equality in the workplace, social power, sense of belonging, detachment, respect for tradition, and acceptance (Schwartz & Bilsky, 1987, Schwartz & Bilsky, 1990). The values for each subject are grouped into the following categories: conformity, benevolence, tradition, universalism, self-direction, stimulation, hedonism, achievement, power, and security. The SVS contains fifty-six value items that are divided into two lists. Subjects rated the values on the two value lists according to a nine-point scale ranging from negative one (opposed to personal values) to seven (of supreme importance). Higher scores indicate that individuals believe the construct to be of high personal importance or value. The coefficient alpha value was calculated for each construct using our sample. Coefficient alpha was .65 for the conformity scale, .47 for the tradition scale, .73 for the benevolence scale, .72 for the universalism scale, .60 for the self-direction scale, .72 for the stimulation scale, .62 for the hedonism scale, .62 for the achievement scale, .70 for the power scale, and .65 for the security scale. Table 8 provides a description of the cultural values measured by the SVS. See Appendix H for the complete measure.

Table 8. *Schwartz Cultural Values Survey Factors*

Factor	Description
Achievement	Measures personal success according to social standards.
Benevolence	Measures preservation and enhancement of the welfare of people to whom one is close.
Conformity	Measures restraint of actions and impulses that may harm others and violate social expectations.
Hedonism	Measures pleasure or sensuous gratification.
Power	Measures social status or dominance over people and resources.
Security	Measures safety and stability of society, relationships, and self.
Self-Direction	Measures independence of thought and action.
Stimulation	Measures excitement and novelty.
Tradition	Measures respect and commitment to cultural or religious customs and ideas.
Universalism	Measures understanding, tolerance, and protection for the welfare of all people and nature.

Cognition Measures

Embedded Figures Test. The Embedded Figures Test (EFT) is a standardized measure of the cognitive style known as field dependence/independence (Witkin, 1950). Field independence refers to a tendency to approach the environment in an analytical fashion as opposed to a global manner, as in field dependence. Individuals who are field independent are able to perceive figures separately from their backgrounds. These individuals are able to extract information from its surrounding context. Field dependent individuals, however, perceive events in an undifferentiated way. They are less able to extract information from its surrounding context. In addition, these individuals have a greater social orientation than field independent persons. A number of studies have shown that EFT performance is related to performance on other perceptual tests. Such tests involve the ability to overcome an embedding context and to perform in a variety of intellectually stimulating tasks

(Goodenough & Karp, 1961; Karp, 1963). The EFT requires the participant to locate simple shapes that are embedded within larger figures. The EFT score is the average time (computed in seconds) required to distinguish the simple forms from the larger figures. Thus, higher scores reflect greater difficulty in differentiating a simple form from a wider pattern (i.e., higher field dependence). Coefficient alpha for this scale was .57. The EFT is a copyrighted instrument, so we do not include a copy of it in this report.

Shared Mental Model (SMM). A questionnaire was developed to measure participants' shared mental model of task work required to fly together successfully. Ten attributes of the task were selected based on their relevance to flight: altimeter, speed, stalling, climbing, landing, flare, throttle, straight and level flight, and pitch. Participants were given pairs of task concepts critical to the mission and were asked to rate the degree of relatedness between each pair using a nine point scale ranging from negative four (negatively related) to positive four (positively related) (Mathieu, Heffner, Goodwin, Salas, & Canon-Bowers, 2000). A rating of zero meant that the participant believed the concepts were not related. Participants completed a total of thirty-six judgments. Ratings of task shared mental model for each team were analyzed by calculating the correlation between each member's ratings of task relatedness across all paired comparisons. Correlations may range from –1 (complete disagreement) to +1 (complete sharedness). The mean SMM correlation or index for Scenario 1 was .21 (standard deviation .21), with values ranging from -.37 to .67. For Scenario 2, the mean SMM correlations or index was .26 (standard deviation .21), with values ranging from -.36 to .62. The reported means and standard deviations for our SMM measure are similar to means and standard deviations obtained by Mathieu et al. (2000). See Appendix I for the complete measure.

NASA Task Load Index (TLX). The NASA Task Load Index (TLX) is a subjective workload measure developed by Hart and Staveland (1988). The TLX consists of the following six dimensions: mental demand, physical demand, temporal demand, performance, effort, and frustration. For each dimension, respondents indicate their perceptions of workload on a one hundred-point, bipolar scale. TLX dimensions are labeled from either *low* to *high* or *good to poor*. Thus, high or good indicates high score on the factor and low or bad indicates a low score on the factor. Although the TLX is a widely used measure, there has been little empirical research on its psychometric properties. Subjective workload measures in general, including the TLX, are not commonly evaluated in terms of their reliability and validity (Gopher & Donchin, 1986). When reliability is addressed in research, test-retest reliability is most commonly reported. The TLX demonstrates good test-retest reliability, with correlations ranging between .83 and .88 (Hart & Staveland, 1988). Reliability analysis using the present sample yielded coefficient alphas of .64 for post-scenario one TLX and .66 for post-scenario two TLX. Table 9 provides a description of each of the factors assessed in the TLX. See Appendix J for complete measure.

Table 9. *NASA TLX Factors*

Factor	Description
Effort	Measures the mental and physical energy exerted to accomplish team goals (e.g., "How hard did you have to work (mentally and physically) to accomplish your level of performance?")
Frustration	Measures the emotional response of members as they work through a task (e.g., "How insecure, discouraged, irritated, stressed and annoyed versus secure, gratified, content, relaxed and complacent did you feel during the task?")
Mental Demand	Measures the mental and perceptual activity required of a task (e.g., "Was the task easy or demanding?")
Performance	Measures the level of satisfaction that members feel regarding the accomplishment of goals (e.g., "How successful do you think you were in accomplishing the goals of the task set by the experimenter (or yourself)?")
Physical Demand	Measures the amount of physical activity involved in a task (e.g., "Was the task restful or laborious?")
Temporal Demand	Measures the time pressure team members may experience as they work on a task (e.g., "Was the pace slow and leisurely or rapid and frantic?")

Training Measures (Manipulation Check)

Flight Knowledge. A test was developed to assess participants' knowledge of flight principles taught during training. This test was administered prior to and after completion of the training to assess learning and training effectiveness. Thirteen multiple-choice items were developed from the training manual for the pre-test. Parallel multiple-choice items tapping similar flight constructs (e.g., takeoff speed) were developed for the post-test. For each knowledge test, individuals received one point for each correct answer and zero points for incorrect answers. The number of correct responses was computed for each participant for the knowledge pretest and posttest, respectively. Higher scores indicate greater flight knowledge. The pre-test knowledge instrument is located in Appendix K. The posttest knowledge instrument is located in Appendix L.

Teamwork and Error Measures

Team Behavior and Error Checklist. A checklist to rate team behaviors and errors was developed and used to code videotapes of the simulated flights. Crew resource management (CRM) behaviors identified by Davis (1999) were measured. Team behaviors initially included: backup, communication, coordination, decision making, feedback, monitoring, situational awareness, and team leadership. Assertiveness, because it is identified in the CRM literature as important to team performance, was also included (Bowers, Morgan, Salas, & Prince, 1993; Fowlkes, Lane, Salas, Franz, & Oser, 1994). For each behavior, a definition and several examples of the behavior were included on the checklist. Examples of behaviors that were not directly observable or those that were unrelated to the current project (i.e., would not be observed in flight) were also eliminated. Team behaviors were coded as frequencies of distinct observable behavioral episodes defined in the team behavior checklist. High frequencies indicate a greater occurrence of the behavior. See Table 10 for a description of each factor and Appendix M for a list of examples. Every attempt was made to ensure that the behavioral dimensions were orthogonal, however we acknowledge that in some cases one behavioral episode may have contained more than one team behavior. In those instances where one behavioral episode contained more than one team behavior, we coded the behavior as belonging to the predominant team behavior dimension.

Flight crew errors were also included in the checklist. Helmreich, Klinect, and Wilhelm (1999) identified five classes of error behaviors. We used their typology as a basis for rating team errors, but reduced the number of error categories from five to four. We combined intentional non-compliance errors and procedural errors into non-compliance errors. Then, we changed the wording of each class of error behavior to specifically address our scenarios. We also reduced the number of error behaviors within each class that would have been difficult to observe in our experiment. In sum, we rated four types of errors: non-compliance, communication, proficiency, and operational decision. A definition of each error followed by specific examples was included in the behavioral checklist. Several errors unique to our simulated flights were included under the appropriate category to enhance the usability of the checklist. For example, "intentional failure to complete kneeboard during landing" was one of the behaviors placed under the intentional noncompliance category to clarify specific instances of noncompliance. Error behaviors were rated as frequencies. High frequencies indicate greater occurrence of the error. Refer to Table 11 for a description of each error dimension and Appendix M for specific examples.

Flight Outcomes. Flight outcomes for each flight crew were recorded. Outcomes were coded as follows: 0 = land and 1 = crash.

Table 10. *Team Behaviors*

Factor	Description
Assertiveness	Demonstrates ability to initiate action.
Backup	Provides assistance in the performance of other team members.
Communication	Exchanges information for the purpose of clarifying or acknowledging receipt of information.
Coordination	Team members execute their activities in a timely and integrated manner. May involve an exchange of information that subsequently influences another member's team performance.
Decision-making	Ability to make logical and sound judgments based on available information.
Feedback	Gives, seeks, and receives information involving team members.
Monitoring	Observes the activities and performance of other team members.
Situational Awareness	Maintains an accurate perception of the internal and external environment.
Team Leadership	Provides directions, structure, and support for other team members. Can be shown by both pilot and copilot.

Table 11. *Error Behaviors*

Factor	Description
Communication	Information that is incorrectly transmitted or interpreted within the cockpit crew or between the cockpit crew and external sources.
Non-Compliance	Intentional violations of standard operating procedures.
Operational Decision	Discretionary decisions not covered by regulations and procedures that unnecessarily increases risk.
Proficiency	Lack of knowledge or a lack of stick and rudder skill.

Videotapes were made of each crew's flight. Trained observers evaluated the crew's performance according to the Team Behavior Checklist. Two trained observers independently scored six tapes to determine interrater reliability. Table 12 shows the correlations and intraclass coefficients (ICCs) across the two raters for each dimension of the Team Behavior Checklist. Correlations were generally good, ranging from a low of .42 for Feedback to .99 for Monitoring. The average inter-rater reliability across all dimensions was .88.

Table 12. *Interrater Reliability Results*

Dimension	Correlation	ICC
Assertiveness	.96	.97
Decision-making	.98	.96
Monitoring	.99	.93
Feedback	.42	.57
Backup	.84	.68
Coordination	.96	.78
Situational awareness	.96	.83
Leadership	.94	.96
Communication	.94	.88
Noncompliance errors	.77	.87
Communication errors	.80	.77
Proficiency errors	.92	.95
Operational decision errors	.90	.89
Average	.88	.85

Training Procedures

After participants were recruited and agreed to participate, they were assigned a flight instructor. The instructor provided an informed consent document to read and sign. Participants were also given a list of Frequently Asked Questions (FAQs) to explain the experiment's requirements and a list of contacts that contained the phone numbers and email addresses of the research laboratory and its staff. Participants were given a training manual for reference throughout the training. They were then given an initial set of questionnaires. This set of measures included the demographic questionnaire, the training pre-test, the NEO Personality Inventory-Revised, the Schwartz Cultural Values Survey, the Chinese Personality Assessment Inventory (CPAI), the Flight Management Attitudes Questionnaire, the Individualism-Collectivism and Power Distance scales, and the Embedded Figures Test. Participants were required to complete all questionnaires in the laboratory. Chinese students were given access to a Chinese-English dictionary for translation purposes.

After completing this initial set of questionnaires, participants scheduled an appointment to begin flight training. Training sessions were one to two hours in duration. All participants were trained under visual flight rules (VFR). Participants were allotted up to twelve hours to complete the training. If participants were not able to complete the training within twelve hours, they were told they would be asked to leave the study. No participants exceeded the twelve-hour training time limit. Following flight training, but before administration of the proficiency test, participants were required to learn how to calculate fuel levels given time and speed information using the AirClassics E6-B Flight Computer. Participants were also required to listen to a sample tape recording of simulated air-traffic control (ATC) communication via headphones. This sample was a simulation of the ATC directions that would be provided during the experimental flights.

After completion of flight computer training and simulated ATC recording, participants were required to pass the Microsoft Flight Simulator 2000 Check-ride. Participants were allowed to attempt the check-ride as many times as necessary to pass. However, at no time were participants allowed to exceed the twelve-hour training time limit imposed at the beginning of the study. Most participants passed the proficiency test within three attempts. Upon completion of the proficiency test, the TLX-workload pre-test was administered. Finally, participants were given a post-test that measured flight knowledge after completion of the training.

Scenario Procedures

Two scenarios were created for participants to complete the experimental flight. These scenarios were developed with the input of several subject matter experts from NASA-LARC. Each scenario was pilot-tested twice and revised. Appendix N contains information about programming the scenarios on the computers and Appendix O contains a detailed description of each scenario including the script for the ATC communications. Table 13 lists chief elements of each scenario.

Participants were randomly assigned to the role of pilot or copilot for their first flight. Those individuals who participated in a second flight were assigned the role not enacted during their first flight. Additionally, scenarios were counterbalanced for individuals who were assigned to the two-scenario condition. Participants were separately given a pre-flight briefing explaining their mission and their responsibilities during the flight. Participants were then led to the flight simulator room.

Prior to takeoff, recorded communication was presented to simulate ATC. The first communication contained information about the flight including current location and destination, current weather, weather at the destination, cruising altitude, airspeed, heading, distance from the destination, approximate arrival time, navigation method (global positioning system or GPS), fuel levels, and a reminder of pilot ratings (visual flight rules or VFR certified). Simulated ATC also was presented to the participants throughout the flight to update information presented before take-off.

Each crew participated in one or two experimental scenarios consisting of a brief flight between two cities in Ohio. The flights contained several anomalous events designed to elicit team behaviors resulting from stressful flight conditions.

Scenario One. Participants were told their mission was to transport a heart for an organ transplant from Springfield, OH to Cincinnati, OH. They were told it was imperative that they arrive in Cincinnati on time because the transplant team had already begun preparing the transplant recipient. Approximately five to eight minutes into the flight (depending on how long the crew took preparing to take off), the attitude indicator was programmed to malfunction. This event forced participants to rely on other instruments to determine the aircraft's attitude. Additionally, the weather was programmed to deteriorate from favorable conditions to heavy thunderstorms along the flight path.

In Scenario One, only the copilot received ATC communications. The copilot was told to relay ATC communications to the pilot. Ten minutes into the flight, the copilot was informed via ATC that the weather conditions at the destination airport were deteriorating. They were advised that transferring to instrument flight rules (IFR) was *possible*. Prior to takeoff, the copilot was reminded via ATC that they were rated to fly only under visual flight rules (VFR), and could not fly under IFR conditions. During each of the remaining ATC updates, the copilot was advised that weather conditions at the destination airport were continuing to deteriorate. Pilots with VFR ratings were *advised* or *urged* to make alternate plans. Participants were never directly told they could not land at the destination airport. The decision to land at the destination airport or divert to an alternate airport was left to the participants.

Weather for Scenario One was programmed along the flight path to gradually worsen near the destination airport. The weather at the destination airport and the closest alternate airport was programmed for thunderstorms, very high precipitation, one-half mile visibility, and moderate winds. This weather would make landing difficult, but not impossible.

Scenario Two. Participants were told their mission was to transport medical supplies for flood victims from Columbus, OH to Dayton, OH. Additionally, they were told, because of the weight of the supplies, that the amount of fuel the plane contained was limited. They were given just enough fuel to get to their destination but were told to be vigilant about watching their fuel consumption. Participants were also told their flight plan would take them near forbidden airspace over Wright-Patterson Air Force Base. They were warned to follow ATC commands carefully to avoid unauthorized entry into the airspace. Wind was programmed in the scenario so that the plane would be flying into the wind, causing greater fuel consumption. Both pilot and copilot were given headsets so they could receive simultaneous communications from ATC during their flight.

Approximately eight minutes into the Scenario Two flight, participants were separately given conflicting directions by ATC about where to turn to avoid the unauthorized airspace. The pilot was told to turn to a heading of three-one-zero and the copilot was told to turn to a heading of one-three-zero. Two minutes later pilot and copilot were both told by ATC that their current heading should be one-three-zero. Fifteen minutes into the flight the crew was told they had cleared the forbidden airspace and could now return to their original flight path. This unanticipated detour caused further fuel consumption and required the crew to determine whether they had enough fuel to reach their destination or if they should make alternate landing plans.

Copilots in both scenarios were given a Copilot Tracking Log and a Kneeboard to complete during the flight. Appendix P contains a copy of the Copilot Tracking Log. The copilot was required to complete this log every ten minutes. The log was used to record flight related information such as the aircraft's altitude, attitude, and fuel levels as well as weather-related information such as precipitation and wind strength. Appendix Q contains a copy of the kneeboard given to the copilot. The kneeboard includes a list of settings to be maintained for various aircraft instruments during each phase of flight. Participants were trained to check off each task's setting prior to completing that segment of flight. Failure to complete the Copilot Tracking Log and the Kneeboard at any stage during flight was considered an error. After their flight, participants completed a questionnaire assessing Shared Task Mental Model and the TLX-workload measure. They were debriefed, thanked for their time, and told they may be contacted to complete a second flight.

For the second flight, participants were assigned to fly in the scenario in which they had not yet flown. They were also assigned their role (pilot or copilot) based upon their role in the previous scenario. For example, if a participant had served as pilot in Scenario One, he was assigned the role of copilot in Scenario Two. After completion of their second flight, participants again completed the Shared Mental Model (Task) questionnaire and the TLX-workload measure.

Table 13. *Elements of the Experimental Scenarios*

Element	Scenario One	Scenario Two
Departing airport	Springfield, OH	Columbus, OH
Destination airport	Cincinnati, OH	Dayton, OH
Approximate Flight Time	35 minutes	35 minutes
Equipment Failure	Yes (altimeter)	No
Weather		
Precipitation	Thunderstorms	None
Wind	Moderate to Severe	Moderate
Visibility	½ to 1 mile	30 miles
Gas Levels		
Left	Full	4 gallons
Right	Full	3 gallons
ATC Communications	Only Copilot	Pilot and Copilot
Anomalies	Instrument failure Severe weather Ambiguous ATC information	Low fuel Flying into wind Conflicting directions Forbidden airspace

RESULTS

Levels of Analysis in Data Analysis

We conducted the data analysis at two levels: individual and team. At the individual level of analysis (I → I) we examined relationships between variables for each individual. To illustrate, we used personality trait scores for each individual to predict that same individual's teamwork, for example, using individual conscientiousness to predict individual situational awareness. At the team level of analysis (T → T), we aggregated scores of team members to create a team average score. We then examined relationships between variables using team average scores, for example, using team consciousness to predict team situation awareness.

We analyzed the data at two levels of analysis for three reasons. First, recent research in teamwork shows that both approaches are valid but they may yield different information (Barrick, Stewart, Neubert, & Mount, 1998). The second reason is that relationships between predictors and criteria may change with different levels of analysis (Ostroff, 1993). Finally, when only one level of analysis is examined in isolation, it is not possible to compare variable relationships at different levels to determine if different processes are operating at the individual and team levels (Rousseau, 1985).

Power

We report power for each type of statistical analysis we conducted at both levels of analysis using obtained effect sizes. Because Bonferroni adjusted significance levels were different for team and error behaviors (i.e., .011 for team behaviors and .025 for error behaviors), we report separate power estimates for team behaviors and error behaviors. For the multivariate analysis of variance (MANOVA) at the I → I level, observed power for the Pillai's trace value was 1.00 for team behaviors and .92 for error behaviors. At the T → T level, observed power for MANOVA (Pillai's trace value) was 1.00 for team behaviors and .95 for error behaviors. Power for the univariate analysis of variance (ANOVA) for team behaviors at the I → I level ranged from .14 for a small effect size (eta = .10), to .92 for a medium effect size (eta = .25), to 1.00 for a large effect size (eta = .40). For error behaviors at the I → I level, power ranged from .23 for a small effect size, to .96 for a medium effect size, to 1.00 for a large effect size. At the T → T level, power for team behavior ANOVAs ranged from .06 for small effect sizes, to .56 for medium effect sizes, and .97 for large effect sizes. Finally, power for error behavior ANOVAs at the T → T level ranged from .11 for small effect sizes, .69 for medium effect sizes, and .99 for large effect sizes.

Observed power for multivariate analysis of covariance (MANCOVA) for team behaviors at the I → I level was .91 for the covariate, knowledge posttest score (Pillai's trace), and 1.00 for the independent variable, experimental condition (Pillai's trace). Power for error behaviors at the I → I level was .23 (Pillai's trace) for the covariate, knowledge posttest score, and .99 for the independent variable, experimental condition (Pillai's trace). At the T → T level, observed power for team behaviors MANCOVA at the T → T level was .96 for the covariate, knowledge posttest score (Pillai's trace), and 1.00 for the independent variable, experimental condition (Pillai's trace). Observed power for error behaviors was .07

for the covariate, knowledge posttest score (Pillai's trace) and .94 for the independent variable, experimental condition (Pillai's trace). Observed power for univariate analysis of covariates (ANCOVA) at the I → I level ranged from .13 to 1.00 for the effect of experimental condition on team behaviors after controlling for knowledge posttest scores. At the I → I level, observed power for the effect of experimental condition on error behaviors after controlling for knowledge posttest scores ranged from .28 to .99. Observed power for ANCOVA at the T → T level ranged from .08 to .99 for the effect of experimental condition on team behaviors holding knowledge posttest scores constant. Finally, power for the effect of experimental condition on error behaviors at the T → T level ranged from .18 to .98 after controlling for knowledge posttest scores.

For multiple regression analyses, power for team behavior analyses at the I→ I level ranged from .05 (cumulative $R^2 = .01$) to 1.00 (cumulative $R^2 = .27$). For analyses of error behaviors at the I → I level, power ranged from .21 (cumulative $R^2 = .02$) to .98 (cumulative $R^2 = .16$). At the T → T level, observed power for team behavior analyses ranged .03 (cumulative $R^2 = .01$) to 1.00 (cumulative $R^2 = .23$). Finally, observed power for T → T error behavior analyses ranged from .09 (cumulative $R^2 = .01$) to 1.00 (cumulative $R^2 = .24$).

Flight Outcomes

We examined the effect of experimental condition on flight outcome at the individual and team levels of analysis. Flight outcomes were considered either land (coded as 0) or crash (coded as 1). At the individual level, the overall model for experimental condition predicting flight outcome was not significant, X^2 (2, N = 298) = .51, *n.s.* Experimental condition could not reliably distinguish between landings and crashes. The model correctly classified 100% of landings and 0% of crashes. Overall experimental condition correctly classified 65.8% of flight outcomes. At the team level, the overall model for experimental condition predicting flight outcome as not significant, X^2 (2, N = 149) = .40, *n.s.* Experimental condition could not reliably distinguish between landings and crashes. The model correctly classified 100% of landings and 0% of crashes. Overall, experimental condition correctly classified 66.2% of flight outcomes. Next, we used logistic regression to predict flight outcomes from team and error behaviors the individual and team levels of analysis. Results of these analyses are presented below.

Individual Level of Analysis (I → I). The total N for the individual level of analysis is 298. Each scenario was considered an independent observation for the purpose of this analysis. That is, team and error behaviors and flight outcomes were unique for each experimental session. If a participant completed two scenarios, each scenario was included in the analysis. Thus, although there were only 196 individuals in our sample, there were 298 scenarios. Correlations for all variables used in the I → I analysis are presented in Table 14.

Team Behaviors

The overall model for team behaviors predicting flight outcome was significant, X^2 (9, N = 298) = 29.93, $p \leq .001$ (See Table 16). The combination of team behaviors

reliably distinguished between landings and crashes. The combined team behavior variables correctly classified 91.3% of landings but only 26.7% of crashes. Overall the combined team behavior variables correctly classified 69.3% of flight outcomes. Coordination (Wald statistic = 10.25, B = -.54, p = .001), monitoring (Wald statistic = 8.19, B = .15, p = .004), situational awareness (Wald statistic = 4.75, B = .07, p = .029), and team leadership (Wald statistic = 7.15, B = -.08, p = .007) were significant predictors. Individuals who displayed less team leadership and were less adept at coordinating their efforts with their flying partner were more likely to crash. Also, individuals who exhibited more monitoring and more situational awareness were more likely to crash.

Error Behaviors

The overall model for error behaviors predicting flight outcomes at the individual level was not significant, X^2 (4, N = 298) = 5.92, *n.s.* (See Table 16). Error behaviors did not reliably distinguish between landings and crashes. The combination of error behavior variables correctly classified 96.9% of landings, but only 4% of crashes. Overall the combined error behavior variables correctly classified 65.2% of flight outcomes. Operational decision errors was a significant predictor (Wald statistic = 2.92, B = .26, p = .087). Individuals who made more operational decision errors were more likely to crash.

*Team Level of Analysis (*T → T*).* There were a total of 149 teams in our sample; therefore the total N for this analysis is 149. Team and error behaviors were aggregated to the team level using the mean of pilot and copilot (i.e., individual) frequencies. Correlations for all variables used in the T → T analysis are presented in Table 15.

Team Behaviors

The overall model for team behaviors predicting flight outcomes at the team level was significant, X^2 (9, N = 149) = 24.97, $p \leq .01$ (See Table 16). Team behaviors reliably distinguished between landings and crashes. The combined team behavior variables correctly classified 91.8% of landings and 38% of crashes. Overall the combined team behavior variables correctly classified 73.6% of flight outcomes. Coordination (Wald statistic = 4.64, B = -.58, p = .031), monitoring (Wald statistic = 10.88, B = .47, p = .001), and team leadership (Wald statistic = 7.70, B = -.19, p = .006) were significant predictors. Like at the individual level of analysis, teams that were less coordinated and displayed less team leadership were more likely to crash. Teams that engaged in more monitoring were also more likely to crash.

Error Behaviors

The overall model for error behaviors predicting flight outcomes at the team level was not significant, X^2 (4, N = 149) = 4.46, *n.s.* (See Table 16). The combination of error behaviors could not reliably distinguish between landings and crashes. The combined error behavior variables correctly classified 95.9% of landings, but only 6% of crashes. Overall the combined error behavior variables correctly classified 65.5% of flight outcomes. None of the four error behaviors was a significant predictor of crashes.

Table 14.
I → I Correlations Between Team and Error Behaviors and Flight Outcome

Variable	1	2	3	4	5	6	7	8
1. Experimental Condition Dummy Code 1	--							
2. Experimental Condition Dummy Code 2	-.01	--						
3. Assertiveness	-.12*	.13*	--					
4. Decision Making	-.13*	.24**	.49**	--				
5. Situation Awareness	-.02	.28**	.41**	.38**	--			
6. Team Leadership	.02	.00	.27**	.26**	.41**	--		
7. Communication	-.18**	.14*	.69**	.47**	.17**	.09	--	
8. Monitoring	.03	.00	.29**	.17**	.23**	.60**	.07	--
9. Feedback	-.07	.02	.05	.05	.09	.10	.08	.02
10. Backup	-.04	-.12*	.12*	.19**	.20**	.36**	.06	.36**
11. Coordination	-.18**	.37**	.26**	.33**	.35**	.11	.25**	.11
12. Non-Compliance Errors	.01	-.07	-.09	-.06	.03	.27**	-.16**	.34**
13. Communication Errors	.12*	-.21**	-.13*	-.14*	-.10	.09	-.16**	.14*
14. Proficiency Errors	-.04	-.05	-.02	-.07	.19**	-.10	-.11*	-.25**
15. Operational Decision Errors	-.01	-.10	-.07	-.07	.13*	.10	-.17**	.01
16. Flight Outcome	.04	.00	-.09	-.12*	.00	-.06	-.12*	.09

(Table 14 continues)

Note. N = 298. Each scenario was analyzed as a unique case. Team and error behaviors reported here are unique observations, not aggregated means. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese teams, -1 = Single culture American teams, and 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, and 1 = Single culture American teams. Flight outcome coded as follows: 0 = land and 1 = crash. * $p \leq .05$. ** $p \leq .01$.

(Table 14 Continued)

Variable	9	10	11	12	13	14	15	16
1. Experimental Condition Dummy Code 1								
2. Experimental Condition Dummy Code 2								
3. Assertiveness								
4. Decision Making								
5. Situation Awareness								
6. Team Leadership								
7. Communication								
8. Monitoring								
9. Feedback	--							
10. Backup	.01	--						
11. Coordination	.23**	.06	--					
12. Non-Compliance Errors	.04	.07	-.06	--				
13. Communication Errors	-.12*	.01	-.27**	.33**	--			
14. Proficiency Errors	.05	-.12*	.01	-.14*	-.03	--		
15. Operational Decision Errors	.00	.01	-.18**	.05	.19**	.42**	--	
16. Flight Outcome	-.09	.05	-.20**	.03	.09	-.04	.09	--

Note. N = 298. Each scenario was analyzed as a unique case. Team and error behaviors reported here are unique observations, not aggregated means. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese teams, -1 = Single culture American teams, and 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, and 1 = Single culture American teams. Flight outcome coded as follows: 0 = land and 1 = crash. * $p \leq .05$. ** $p \leq .01$.

Table 15
T→ T Correlations Between Team and Error Behaviors and Flight Outcome

Variable	1	2	3	4	5	6	7	8
1. Experimental Condition Dummy Code 1	--							
2. Experimental Condition Dummy Code 2	-.01	--						
3. Assertiveness	-.14	.14	--					
4. Decision Making	-.15	.29**	.55**	--				
5. Situational Awareness	-.03	.34**	.42**	.33**	--			
6.Team Leadership	.02	-.01	.27**	.17*	.44**	--		
7. Communication	-.20*	.14	.78**	.51**	.14	.07	--	
8.Monitoring	.04	.00	.29**	.14	.29**	.54**	.04	--
9. Feedback	-.07	.03	.03	.08	.09	.25**	.07	.12
10. Backup	-.06	-.16	.04	.11	.15	.17*	.03	.17*
11. Coordination	-.18*	.37**	.29**	.41**	.40**	.15	.26**	.17*
12. Non-Compliance Errors	.02	-.12	-.17*	-.15	.15	.12	-.28**	.09
13. Communication Errors	.18*	-.30**	-.17*	-.24**	.03	.09	-.22**	.01
14. Proficiency Errors	-.07	-.07	.05	.03	.34**	.45**	-.13	.31**
15. Operational Decision Errors	-.02	-.11	-.12	-.08	.20*	.34**	-.20*	.21*
16. Flight Outcome	.04	-.03	-.10	-.15	.00	-.10	-.14	.17*

(Table 15 continues)

Note. N = 149. Team and error behaviors are means of pilot and copilot scores. Experimental condition dummy code 1 coded as follows: 1 = Single culture Chinese teams, -1 = Single culture American teams, and 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, and 1 = Single culture American teams. Flight outcome coded as follows: 0 = land and 1 = crash. * $p \leq .05$. ** $p \leq .01$.

(Table 15 Continued)

Variable	9	10	11	12	13	14	15	16
1. Experimental Condition Dummy Code 1								
2. Experimental Condition Dummy Code 2								
3. Assertiveness								
4. Decision Making								
5. Situational Awareness								
6.Team Leadership								
7. Communication								
8.Monitoring								
9. Feedback	--							
10. Backup	.06	--						
11. Coordination	.26**	.06	--					
12. Non-Compliance Errors	.08	.00	-.10	--				
13. Communication Errors	-.09	.01	-.38**	.21*	--			
14. Proficiency Errors	.00	.03	.01	.37**	.33**	--		
15. Operational Decision Errors	.00	.04	-.18*	.36**	.43**	.56**	--	
16. Flight Outcome	-.09	.08	-.18*	.05	.12	-.05	.07	--

Note. N = 149. Team and error behaviors are means of pilot and copilot scores. Experimental condition dummy code 1 coded as follows: 1 = Single culture Chinese teams, -1 = Single culture American teams, and 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, and 1 = Single culture American teams. Flight outcome coded as follows: 0 = land and 1 = crash. * $p \leq .05$. ** $p \leq .01$.

Table 16. *Logistic Regression Results for Team and Error Behaviors Predicting Flight Outcomes*

	I→I					T→T				
Behavior	*B*	*SEB*	Wald Statistic	*p*	Odds Ratio	*B*	*SEB*	Wald Statistic	*p*	Odds Ratio
Analysis 1: Team Behaviors										
Assertiveness	-.02	.02	.42	.517	.99(.94 to 1.03)	-.03	.05	.48	.489	.97(.88 to 1.07)
Backup	.04	.05	.61	.435	1.04(.95 to 1.14)	.08	.09	.82	.365	1.08(.92 to 1.28)
Communication	.00	.02	.05	.821	1.00(.97 to 1.03)	.01	.03	.05	.830	1.01(.95 to 1.07)
Coordination	-.54	.17	10.25	.001***	.58(.42 to .81)	-.58	.27	4.64	.031**	.56(.33 to .95)
Decision-making	-.07	.09	.60	.440	.93(.78 to 1.12)	-.11	.17	.44	.508	.89(.64 to 1.25)
Feedback	-.18	.21	.77	.380	.83(.56 to 1.25)	-.28	.38	.54	.464	.76(.36 to 1.59)
Monitoring	.15	.05	8.19	.004***	1.16(1.05 to 1.28)	.47	.14	10.88	.001***	1.59(1.21 to 2.10)
Situational Awareness	.07	.03	4.75	.029**	1.07(1.01 to 1.13)	.09	.06	2.19	.139	1.09(.97 to 1.22)
Team Leadership	-.08	.03	7.15	.007***	.92(.87 to .98)	-.19	.07	7.70	.006***	.83(.72 to .95)
Analysis 2: Error Behaviors										
Communication Errors	.08	.07	1.33	.250	1.08(.95 to 1.24)	.19	.15	1.66	.197	1.21(.91 to 1.62)
Non-Compliance Errors	-.01	.06	.03	.869	.99(.89 to 1.11)	.08	.14	.36	.549	1.09(.83 to 1.43)
Operational Decision Errors	.26	.15	2.92	.087*	1.29(.96 to 1.73)	.22	.28	.63	.429	1.25(.72 to 2.14)
Proficiency Errors	-.06	.04	1.62	.203	.95(.87 to 1.03)	-.15	.10	2.23	.135	.86(.71 to 1.05)

Note. I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered $*p \leq .10$, $**p \leq .05$, $***p \leq .01$

Team Behaviors Predicting Error Behaviors

We regressed each of the four error behaviors—communication errors, non-compliance errors, operational decision errors, and proficiency errors—onto the combination of nine team behaviors. Our objective was to examine how team behaviors influence errors and error management. As in previous regression analyses, we used a hierarchical strategy. Team behaviors were entered in the first step, followed by experimental condition in the second step. Experimental condition was coded with two dummy variables for each level of analysis. D1 compares the mixed culture condition with the average of the same culture American and same culture Chinese conditions. D2 compares the same culture American condition with the same culture Chinese condition. We present results of these analyses for each error behavior below.

Individual Level of Analysis. The total N for this analysis was 298. We analyzed each scenario as a separate case. While some participants completed two scenarios, each scenario was an independent observation because the nature of each situation and composition of the flight crew differed. Thus, while there only are 196 participants in our sample, there were 298 simulation sessions. Correlations for all variables used in analysis are presented in Table 17.

Communication Errors

In step one, team behaviors explained 12 percent of variance in non-compliance errors ($R^2 = .12, p = .000$; see Table 19). Team coordination was a significant predictor ($\beta = -.23, p = .000$). Individuals who demonstrated better coordination made fewer communication errors. In step two, experimental condition did not significant unique variance in communication errors ($\Delta R^2 = .02, p = .083$). The beta weight for dummy code 2 approached the adjusted Bonferroni significance level of $p = .025$. Individuals in single culture Chinese teams made more communication errors than individuals in single culture American teams ($\beta = -.13, p = .038$). The final equation was significant, $F(11, 282) = 4.11$, $p \leq .025$.

Non-Compliance Errors

Team behaviors entered in step one explained significant variance in non-compliance errors ($R^2 = .18, p = .000$; see Table 20). The regression coefficient for monitoring was significant ($\beta = .33, p = .000$). Individuals who demonstrated more monitoring made more non-compliance errors. Another predictor, team leadership, approached the adjusted Bonferroni significance level. Individuals who exhibited more team leadership made more non-compliance errors ($\beta = .15, p = .039$). In step two, experimental condition failed to explain unique variance in non-compliance errors ($\Delta R^2 = .00, p = .564$). The final equation was significant, $F(11, 282) = 5.72, p \leq .025$.

Operational Decision Errors

In step one, team behaviors explained significant variance in operational decision errors ($R^2 = .11, p = .000$; see Table 21). Coordination ($\beta = -.24, p = .000$) and situational awareness ($\beta = .22, p = .002$) predicted operational decision errors. Individuals who demonstrated better coordination made fewer operational decision errors. Also, individuals

who displayed more situational awareness made more operational decision errors. Experimental condition, entered in step two, did not explain significant unique variance ($\Delta R^2 = .01, p = .253$). The final equation was significant, $F(11, 282) = 3.38, p \leq .025$.

Proficiency Errors

Team behaviors, entered in step one, explained significant variance in proficiency errors ($R^2 = .17, p = .000$; see Table 22). Regression coefficients for three individual predictors were significant: communication ($\beta = -.21, p = .012$), monitoring ($\beta = -.30, p = .000$) and situational awareness ($\beta = .29, p = .000$). Individuals who communicated more frequently and demonstrated more monitoring made fewer proficiency errors. Individuals who displayed more situational awareness made more proficiency errors. In step two, experimental condition failed to explain significant unique variance ($\Delta R^2 = .02, p = .060$). The final equation was significant, $F(11, 282) = 5.88, p \leq .025$.

Team Level of Analysis. There were 149 teams in our study, hence the total N for this analysis was 149. Correlations for all variables used in analysis are presented in Table 18.

Communication Errors

In step one, team behaviors explained 22 percent of variance in communication errors ($R^2 = .22, p = .000$; see Table 19). Team coordination ($\beta = -.41, p = .000$) and situational awareness ($\beta = .24, p = .021$) were significant predictors. Teams that were better coordinated made fewer communication errors. Additionally, teams that exhibited more situational awareness made more communication errors. Experimental condition entered in step two explained unique variance ($\Delta R^2 = .06, p = .006$). Dummy code 2 was significant ($\beta = -.27, p = .002$). Single culture Chinese teams made more communication errors than single culture American teams. The final equation was significant, $F(11, 137) = 4.70, p \leq .025$.

Non-Compliance Errors

In step one, team behaviors explained significant variance in non-compliance errors ($R^2 = .15, p = .006$; see Table 20). Situational awareness predicted non-compliance errors ($\beta = .26, p = .015$). Teams that displayed more situational awareness made more non-compliance errors. The addition of experimental condition in step two failed to explain significant unique variance ($\Delta R^2 = .02, p = .197$). The final equation was significant, $F(11, 137) = 2.55, p \leq .025$.

Operational Decision Errors

Team behaviors, entered in step one, accounted for 25 percent of variance in operational decision errors ($R^2 = .25, p = .000$; see Table 21). Beta weights for three predictors were significant: coordination ($\beta = -.27, p = .003$), situational awareness ($\beta = .26, p = .009$) and team leadership ($\beta = .29, p = .003$). Teams that were better coordinated made fewer operational decision errors. Teams that displayed more situational awareness and more team leadership made more operational decision errors. Experimental condition, entered in step two, failed to explain significant unique variance ($\Delta R^2 = .02, p = .160$). The final equation was significant, $F(11, 137) = 4.52, p \leq .025$.

Proficiency Errors.

In step one, team behaviors explained significant variance in proficiency errors (R^2 = .29, p = .000; see Table 22). Situational awareness (β = .25, p = .009) and team leadership (β = .34, p = .000) predicted proficiency errors. Teams that displayed more situational awareness and team leadership made more proficiency errors. In step two, the amount of variance in proficiency errors explained by experimental condition approached the Bonferroni adjusted level of significance (ΔR^2 = .03, p = .035). The final equation was significant, F (11, 137) = 5.89, $p \leq .025$.

Table 17.
I → I Correlations Between Team and Error Behaviors

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Assertiveness	--												
2. Decision Making	.49**	--											
3. Situation Awareness	.41**	.38**	--										
4. Team Leadership	.27**	.26**	.41**	--									
5. Communication	.69**	.47**	.17**	.09	--								
6. Monitoring	.29**	.17**	.23**	.60**	.07	--							
7. Feedback	.05	.05	.09	.10	.08	.02	--						
8. Backup	.12*	.19**	.20**	.36**	.06	.36**	.01	--					
9. Coordination	.26**	.33**	.35**	.11	.25**	.11	.23**	.06	--				
10. Non-Compliance Errors	-.09	-.06	.03	.27**	-.16**	.34**	.04	.07	-.06	--			
11. Communication Errors	-.13*	-.14*	-.10	.09	-.16**	.14*	-.12*	.01	-.27**	.33**	--		
12. Proficiency Errors	-.02	-.07	.19**	-.10	-.11*	-.25**	.05	-.12*	.01	-.14*	-.03	--	
13. Operational Decision Errors	-.07	-.07	.13*	.10	-.17**	.01	.00	.01	-.18**	.05	.19**	.42**	--

Note. N = 298. Each scenario was analyzed as a unique case. Team and error behaviors reported here are unique observations, not aggregated means. * $p \leq .05$. ** $p \leq .01$.

Table 18.
T→ T Correlations Between Team and Error Behaviors

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Assertiveness	--												
2. Decision Making	.55**	--											
3. Situational Awareness	.42**	.33**	--										
4. Team Leadership	.27**	.17*	.44**	--									
5. Communication	.78**	.51**	.14	.07	--								
6. Monitoring	.29**	.14	.29**	.54**	.04	--							
7. Feedback	.03	.08	.09	.25**	.07	.12	--						
8. Backup	.04	.11	.15	.17*	.03	.17*	.06	--					
9. Coordination	.29**	.41**	.40**	.15	.26**	.17*	.26**	.06	--				
10. Non-Compliance Errors	-.17*	-.15	.15	.12	-.28**	.09	.08	.00	-.10	--			
11. Communication Errors	-.17*	-.24**	.03	.09	-.22**	.01	-.09	.01	-.38**	.21*	--		
12. Proficiency Errors	.05	.03	.34**	.45**	-.13	.31**	.00	.03	.01	.37**	.33**	--	
13. Operational Decision Errors	-.12	-.08	.20*	.34**	-.20*	.21*	.00	.04	-.18*	.36**	.43**	.56**	--

Note. N = 149. Team and error behaviors are means of pilot and copilot scores. * $p \leq .05$. ** $p \leq .01$.

Table 19. *Multiple Regression Results for Team Behaviors and Experimental Condition Predicting Communication Errors at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
Step 1	Team Behaviors I→I: $R^2 = .12$* (.000) T→T: $R^2 = .22$* (.000)								
	Assertiveness	-.02	.02	-.08	.398	-.02	.03	-.10	.507
	Backup	-.02	.04	-.04	.536	.00	.05	.00	.983
	Communication	-.01	.01	-.04	.617	.00	.02	-.03	.819
	Coordination	-.48	.13	-.23	.000*	-.60	.13	-.41	.000*
	Decision Making	-.03	.07	-.03	.645	-.08	.08	-.09	.345
	Feedback	-.15	.14	-.07	.256	-.03	.14	-.02	.841
	Monitoring	.09	.04	.16	.029†	.01	.06	.01	.918
	Situational Awareness	-.01	.02	-.03	.716	.07	.03	.24	.021*
	Team Leadership	.03	.02	.09	.244	.03	.03	.09	.369
Step 2	Experimental Condition Variables I→I: $\Delta R^2 =$ .02 (.083) T→T: $\Delta R^2 =$ .06* (.006)								
	Experimental Condition[a] (Dummy Code 1)	.07	.08	.05	.361	.08	.07	.09	.227
	Experimental Condition[b] (Dummy Code 2)	-.31	.15	-.13	.038†	-.44	.14	-.27	.002*

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .025$.

[a] Dummy codes used for both levels: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for both levels: mixed culture (0), single culture Chinese (-1), single culture American (1).

† Denotes result approaching significance. Refer to test for further discussion.

Table 20. *Multiple Regression Results for Team Behaviors and Experimental Condition Predicting Non-Compliance Errors at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
Step 1	Team Behaviors I→I: $R^2 = .18*$ (.000) T→T: $R^2 = .15*$ (.006)								
	Assertiveness	-.04	.02	-.16	.059	-.01	.03	-.08	.631
	Backup	-.06	.05	-.08	.206	-.02	.05	-.04	.640
	Communication	-.01	.01	-.06	.478	-.02	.02	-.21	.145
	Coordination	-.11	.15	-.04	.481	-.21	.14	-.14	.138
	Decision Making	-.03	.08	-.03	.698	-.04	.09	-.05	.639
	Feedback	.13	.16	.04	.428	.19	.16	.10	.221
	Monitoring	.22	.05	.33	.000*	.04	.07	.06	.542
	Situational Awareness	.00	.03	.01	.878	.08	.03	.26	.015*
	Team Leadership	.05	.03	.15	.039†	.01	.03	.02	.838
Step 2	Experimental Condition Variables I→I: $\Delta R^2 =$ .00 (.564) T→T: $\Delta R^2 =$ .02 (.197)								
	Experimental Condition[a] (Dummy Code 1)	-.07	.09	-.04	.443	-.05	.08	-.05	.536
	Experimental Condition[b] (Dummy Code 2)	-.12	.17	-.04	.481	-.26	.16	-.15	.098

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .025$.
[a] Dummy codes used for both levels: mixed culture (2), single culture Chinese (-1), single culture American (-1).
[b] Dummy codes used for both levels: mixed culture (0), single culture Chinese (-1), single culture American (1).
† Denotes result approaching significance. Refer to text for further discussion.

Table 21. *Multiple Regression Results for Team Behaviors and Experimental Condition Predicting Operational Decision Errors at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
Step 1	Team Behaviors I→I: $R^2 = .11*$ (.000) T→T: $R^2 = .25*$ (.000)								
	Assertiveness	.00	.01	.02	.854	-.03	.02	-.29	.059
	Backup	-.01	.02	-.02	.707	-.01	.03	-.04	.627
	Communication	-.01	.01	-.16	.054	.00	.01	.01	.941
	Coordination	-.24	.07	-.24	.000*	-.24	.08	-.27	.003*
	Decision Making	-.01	.04	-.01	.851	.02	.05	.04	.692
	Feedback	.05	.07	.05	.435	-.04	.09	-.03	.667
	Monitoring	-.01	.02	-.05	.469	.04	.04	.10	.268
	Situational Awareness	.04	.01	.22	.002*	.05	.02	.26	.009*
	Team Leadership	.01	.01	.08	.307	.06	.02	.29	.003*
Step 2	Experimental Condition Variables I→I: $\Delta R^2 =$ .01 (.253) T→T: $\Delta R^2 =$ .02 (.160)								
	Experimental Condition[a] (Dummy Code 1)	-.05	.04	-.07	.217	-.06	.04	-.11	.149
	Experimental Condition[b] (Dummy Code 2)	-.08	.07	-.07	.298	-.10	.09	-.10	.239

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .025$.
[a]Dummy codes used for both levels: mixed culture (2), single culture Chinese (-1), single culture American (-1).
[b]Dummy codes used for both levels: mixed culture (0), single culture Chinese (-1), single culture American (1).

Table 22. *Multiple Regression Results for Team Behaviors and Experimental Condition Predicting Proficiency Errors at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
Step 1	Team Behaviors I→I: $R^2 = .17*$ (.000) T→T: $R^2 = .29*$ (.000)								
	Assertiveness	.06	.03	.15	.084	-.02	.04	-.07	.613
	Backup	-.07	.07	-.06	.318	-.08	.08	-.07	.341
	Communication	-.05	.02	-.21	.012*	-.02	.03	-.12	.360
	Coordination	-.15	.23	-.04	.515	-.28	.23	-.11	.227
	Decision Making	-.14	.12	-.08	.254	.05	.15	.03	.709
	Feedback	.26	.24	.06	.277	-.27	.25	-.08	.279
	Monitoring	-.29	.07	-.30	.000*	.14	.11	.11	.213
	Situational Awareness	.18	.04	.29	.000*	.13	.05	.25	.009*
	Team Leadership	-.01	.04	-.03	.703	.20	.06	.34	.000*
Step 2	Experimental Condition Variables I→I: $\Delta R^2 =$ .02 (.060) T→T: $\Delta R^2 =$ .03[†] (.035)								
	Experimental Condition[a] (Dummy Code 1)	-.14	.13	-.06	.288	-.23	.12	-.14	.064
	Experimental Condition[b] (Dummy Code 2)	-.54	.26	-.13	.039	-.43	.25	-.14	.087

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .025$.

[a] Dummy codes used for both levels: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for both levels: mixed culture (0), single culture Chinese (-1), single culture American (1).

[†] Denotes result approaching significance. Refer to text for further discussion.

Single Culture versus Mixed Culture Teams

Individual Level of Analysis. For the individual level of analysis (I → I), we examined each scenario as a separate case. For those participants who completed two scenarios as a member of a different crew, their team and error behaviors for each scenario were considered independent observations, and thus analyzed separately. Therefore, the total N for this analysis is 298. Correlations for all variables used in this I → I analysis are presented in Table 23. We first conducted multivariate analyses of variance (MANOVA) to examine the impact of team type on the combination of team behaviors, then on the combination of error behaviors. Pillai's trace for the multivariate test of team type on the combination of team behaviors was 0.28, F (18, 576) = 5.19, p = .000. Pillai's trace for the multivariate test of team type on the combination of error behaviors was .068, F (8, 586) = 2.587, p = .009. We report the Pillai's trace value because cell sizes were unequal. Further, Box's test of equality of covariance matrices was significant for both team and error behaviors. For team behaviors, Box's M = 228.24, F (90, 234209.40) = 2.43, p = .000. For error behaviors, Box's M = 86.070, F (20, 306434.40) = 4.22, p = .000. These significant Box M test values indicate a violation of the assumption of homogeneity of variance-covariance matrices of the team and error behaviors. According to Tabachnick and Fidell (2001), Pillai's trace offers an advantage of robustness when this assumption is violated.

Since the multivariate tests were significant, we conducted univariate analysis of variance (ANOVA) to examine effects of team type on each team and error behavior separately. Results of the ANOVAs are presented in Table 25. It should be noted that the test of homogeneity of variances was significant for one team behavior and two error behaviors. For communication, Levene statistic = 3.19 (2, 295), p = .043. For communication errors, Levene (2, 295) = 9.59, p = .000. For non-compliance errors, Levene statistic (2, 295) = 3.91, p = .021. Using the F_{max} method (the ratio of the largest cell variance to the smallest), we found that this ratio was 2.63 to 1 for communication, 1.44 to 1 for communication errors, and .98 to 1 for non-compliance errors. Each of these cell variance ratios falls well below the accepted 4 to 1 ratio (Tabachnick & Fidell, 2001). We concluded that the violations of homogeneity present in communication, communication errors, and non-compliance errors would have little impact on our results. Pairwise comparison results using the Scheffe test are presented below. Differences between group means are significant at the Bonferroni corrected significance level of .011 for team behaviors and .025 for error behaviors.

Differences were found in assertiveness as a function of team type, F (2, 295) = 4.74, p = .009. Individuals in single culture American teams (M = 15.64) were more assertive than individuals in mixed culture teams (M = 11.83), p = .013. This group difference approaches the adjusted Bonferroni significance criterion level of p = .011.

Teams differed significantly in communication, F (2, 295) = 8.31, p = .000, with individuals in single culture American teams (M = 21.61) communicating more frequently than individuals in mixed culture teams (M = 14.38), p = .000.

There were also significant differences in team coordination, F (2, 295) = 28.56, p = .000. Individuals in single culture American teams (M = 2.62) displayed better coordination compared to individuals in single culture Chinese teams (M = 1.80), p = .000. Individuals in single culture American teams (M = 2.62) also displayed better coordination than individuals in mixed culture teams (M = 1.88), p = .000.

Teams differed significantly in decision making, F (2, 295) = 11.32, p = .000. Individuals in single culture American teams (M = 2.24) made more decisions than individuals in either single culture Chinese teams (M = 1.15), p = .000 or mixed culture teams (M = 1.22), p = .000.

Finally, there were significant differences in situational awareness, F (2, 295) = 12.87, p = .000 across the groups. Individuals in single culture American teams (M = 8.01) demonstrated more situational awareness than individuals in single culture Chinese teams (M = 4.10), p = .000. Also, individuals in single culture American teams (M = 8.01) displayed more situational awareness than individuals in mixed culture teams (M = 5.80), p = .014. This difference in group means nearly reached the adjusted Bonferroni significance level.

Team type differentially affected communication errors as well, F (2, 295) = 9.26, p = .000. Individuals in single culture Chinese teams (M = 1.56) made more communication errors than individuals in single culture American teams (M = .57), p = .001. Individuals in mixed culture teams (M = 1.55) also made more communication errors than individuals in single culture American teams (M = .57), p = .001.

Team Level of Analysis. Each team served as a separate case for the team level of analysis (T → T), yielding a total N of 149. Correlations for all variables used in this T → T analysis are presented in Table 24. As in the individual level of analysis, we first conducted multivariate analysis of variance (MANOVA) to examine the effect of team type on the combination of team behaviors and then on error behaviors. Because values for Box's test of equality of covariance matrices were significant for team and error MANOVAs, we report Pillai's trace values below. Additionally, cell sample sizes were unequal. For team behaviors, Box's M = 152.58, F (90, 57346.85) = 1.55, p = .001. For error behaviors, Box's M = 50.68, F (20, 75029.19) = 4.22, p = .000. Pillai's trace for the multivariate test of team type on the combination of team behaviors was 0.35, F (18, 278) = 3.30, p = .000. Pillai's trace for the multivariate test of team type on the combination of error behaviors was .15, F (8, 288) = 2.95, p = .004.

Since the multivariate tests were significant, we conducted a series of univariate analyses of variance (ANOVAs) to examine effects of team type on each team and error behavior separately. Results of the ANOVAs are presented in Table 25. The Levene test for homogeneity of variances was significant for communication errors, Levene statistic (2, 146) = 7.25, p = .001. The F_{max} (the ratio of the largest cell variance to the smallest) was calculated to be 1.05 to 1, again below the accepted 4 to 1 ratio (Tabachnick & Fidell, 2001). This violation of homogeneity present in communication errors was judged to have little impact on subsequent analyses. Pairwise comparison results using the Scheffe test are presented

below. Differences between group means are significant at the Bonferroni corrected significance level of .011 for team behaviors and .025 for error behaviors.

We found differences in communication as a function of team type, F (2, 146) = 4.58, p = .012. Single culture American teams communicated (M = 21.61) more frequently than mixed culture teams (M = 14.38), p = .012. This difference approaches the adjusted Bonferroni significance level.

Teams differed significantly on coordination, F (2, 146) = 14.59, p =.000. Single culture American teams (M = 2.62) displayed better coordination than either single culture Chinese teams (M = 1.80), p = .000 or mixed culture teams (M = 1.87), p = .000.

Decision making also differed according to team type, F (2, 146) = 8.62, p = .000. Single culture American teams (M = 2.24) made more decisions than single culture Chinese teams (M = 1.15), p = .002. Additionally, single culture American teams (M = 2.24) made more decisions compared to mixed culture teams (M = 1.22), p = .002.

Team type had a significant effect on situational awareness, F (2, 146) = 9.75, p = .000. Single culture American teams (M = 8.01) displayed significantly more situational awareness than same culture Chinese teams (M = 4.10), p = .000.

Finally, frequency of communication errors varied as a function of team type, F (2, 146) = 10.15, p = .000. Single culture Chinese teams (M = 1.56) made more communication errors than single culture American teams (M = .57), p = .001. Similarly, mixed culture teams (M = 1.55) made more communication errors than single culture American teams (M = .57), p = .001.

Table 23.
I → I Correlations Between Team and Error Behaviors

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Assertiveness	--												
2. Decision Making	.49**	--											
3. Situation Awareness	.41**	.38**	--										
4. Team Leadership	.27**	.26**	.41**	--									
5. Communication	.69**	.47**	.17**	.09	--								
6. Monitoring	.29**	.17**	.23**	.60**	.07	--							
7. Feedback	.05	.05	.09	.10	.08	.02	--						
8. Backup	.12*	.19**	.20**	.36**	.06	.36**	.01	--					
9. Coordination	.26**	.33**	.35**	.11	.25**	.11	.23**	.06	--				
10. Non-Compliance Errors	-.09	-.06	.03	.27**	-.16**	.34**	.04	.07	-.06	--			
11. Communication Errors	-.13*	-.14*	-.10	.09	-.16**	.14*	-.12*	.01	-.27**	.33**	--		
12. Proficiency Errors	-.02	-.07	.19**	-.10	-.11*	-.25**	.05	-.12*	.01	-.14*	-.03	--	
13. Operational Decision Errors	-.07	-.07	.13*	.10	-.17**	.01	.00	.01	-.18**	.05	.19**	.42**	--

Note: N = 298. Each scenario was analyzed as a unique case. Team and error behaviors reported here are unique observations, not aggregated means. * $p \leq .05$. ** $p \leq .01$.

Table 24.

T→ T Correlations Between Team and Error Behaviors

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Assertiveness	--												
2. Decision Making	.55**	--											
3. Situational Awareness	.42**	.33**	--										
4. Team Leadership	.27**	.17*	.44**	--									
5. Communication	.78**	.51**	.14	.07	--								
6. Monitoring	.29**	.14	.29**	.54**	.04	--							
7. Feedback	.03	.08	.09	.25**	.07	.12	--						
8. Backup	.04	.11	.15	.17*	.03	.17*	.06	--					
9. Coordination	.29**	.41**	.40**	.15	.26**	.17*	.26**	.06	--				
10. Non-Compliance Errors	-.17*	-.15	.15	.12	-.28**	.09	.08	.00	-.10	--			
11. Communication Errors	-.17*	-.24**	.03	.09	-.22**	.01	-.09	.01	-.38**	.21*	--		
12. Proficiency Errors	.05	.03	.34**	.45**	-.13	.31**	.00	.03	.01	.37**	.33**	--	
13. Operational Decision Errors	-.12	-.08	.20*	.34**	-.20*	.21*	.00	.04	-.18*	.36**	.43**	.56**	--

Note: N = 149. Team and error behaviors are means of pilot and copilot scores. * $p \leq .05$. ** $p \leq .01$.

Table 25. *One-Way Analyses of Variance for Effects of Experimental Condition on Team and Error Behaviors*

Variable	Single Culture American Teams *M*	Single Culture American Teams *SD*	Single Culture Chinese Teams *M*	Single Culture Chinese Teams *SD*	Mixed Culture Teams *M*	Mixed Culture Teams *SD*	*F*	*p*
I -> I								
Assertiveness	15.64[†]	9.90	12.80	9.92	11.83[†]	7.49	4.74	.009*
Backup	2.80	2.77	3.69	3.29	2.96	2.55	2.64	.073
Communication	21.61[c]	14.20	17.22	14.56	14.38[c]	8.99	8.31	.000*
Coordination	2.62[a,c]	.82	1.80[a]	.78	1.88[c]	.91	28.56	.000*
Decision Making	2.24[a,c]	2.19	1.15[a]	1.64	1.22[c]	1.55	11.32	.000*
Feedback	.40	1.03	.35	.68	.26	.67	.72	.488
Team Leadership	4.95	5.87	5.02	6.01	5.16	7.56	.03	.973
Monitoring	2.29	3.36	2.29	2.97	2.45	4.03	.08	.926
Situational Awareness	8.01[a,†]	5.93	4.10[a]	4.18	5.80[†]	5.75	12.87	.000*
Communication Errors	.57[a,c]	1.12	1.56[a]	1.91	1.55[c]	2.29	9.26	.000*
Non-Compliance Errors	1.02	1.93	1.44	2.47	1.28	2.44	.81	.445
Operational Decision Errors	.43	.89	.66	1.04	.51	.88	1.51	.223
Proficiency Errors	2.95	2.96	3.39	3.20	2.80	3.96	.80	.453
T -> T								
Assertiveness	15.64	8.41	12.80	9.24	11.83	6.27	3.07	.049
Backup	2.80	2.04	3.70	2.78	2.96	1.80	2.19	.115
Communication	21.61[†]	13.65	17.22	14.13	14.38[†]	8.02	4.58	.012[†]
Coordination	2.62[a,c]	.79	1.80[a]	.78	1.87[c]	.91	14.59	.000*
Decision Making	2.24[a,c]	1.71	1.15[a]	1.43	1.22[c]	1.23	8.62	.000*
Feedback	.40	1.01	.35	.57	.26	.59	.42	.657
Team Leadership	4.94	3.76	5.02	3.85	5.16	4.67	.04	.966
Monitoring	2.29	1.91	2.29	1.57	2.45	2.36	.12	.887
Situational Awareness	8.01[a]	4.78	4.10[a]	3.44	5.80	4.67	9.75	.000*
Communication Errors	.57[a,c]	.78	1.56[a]	1.19	1.55[c]	1.60	10.15	.000*
Non-Compliance Errors	1.02	1.19	1.44	1.42	1.28	1.47	1.34	.324
Operational Decision Errors	.43	.73	.66	.96	.51	.76	.99	.375
Proficiency Errors	2.95	2.20	3.40	2.13	2.80	2.86	.78	.459

Note: [a]Pairwise comparisons for single culture Chinese/same culture American significant at $p \leq .011$ (Team Behaviors), $p \leq .025$ (Error Behaviors).
[b]Pairwise comparisons for single culture Chinese/Mixed Culture significant at $p \leq .011$ (Team Behaviors), $p \leq .025$ (Error Behaviors).
[c]Pairwise comparisons for single culture American/Mixed Culture significant at $p \leq .011$ (Team Behaviors), $p \leq .025$ (Error Behaviors).
[†] Denotes result approaching significance. Refer to text for further discussion.

In order to conduct a clearer test of the impact of experimental condition on team and error behaviors at both levels of analysis, we controlled for the effect of training. This effect was operationalized as the amount of knowledge gained during training and measured using a knowledge posttest administered upon completion of training. We conducted multivariate analyses of covariance at individual and team levels of analysis by entering knowledge posttest scores in the first step of the analysis, followed by experimental condition in the second step. We discuss results of each of these analyses, as well those of their univariate counterparts below.

Individual Level of Analysis. The total N for the individual level of analysis was 196. The difference in Ns between the ANOVA and ANCOVA results is due to the presence of the individual difference variable, knowledge posttest score. We were unable to analyze each scenario separately as we did in the ANOVAs because each participant had only one posttest score collected after completion of training. Participants who completed two scenarios could not have two sets of posttest scores, for this would violate the independence of observations assumption. Instead, we calculated the mean of team and error behaviors for those participants who completed two scenarios and used that value for MANCOVA and ANCOVA analyses. In other words, we used mean team and error behaviors for participants in the combined single culture American and mixed culture teams and for participants in the combined single culture Chinese and mixed culture teams. For participants who completed only one scenario, actual frequencies of team and error behaviors observed in the scenario were used for analysis.

We first conducted a multivariate analysis of covariance (MANCOVA) to examine the impact of team type on the combination of team behaviors holding constant flight knowledge gained during training. We repeated this analysis for the combination of error behaviors. Correlations for all variables used in analysis are presented in Table 26. After controlling for knowledge posttest scores, team behaviors varied as a function of experimental condition. Pillai's trace for the multivariate test of experimental condition on the combination of team behaviors was 0.61, $F\,(27, 543) = 5.10, p = .00$. Similarly, after controlling for knowledge posttest scores, error behaviors varied as a function of experimental condition. Pillai's trace for the multivariate test of experimental condition on the combination of error behaviors was .17, $F\,(12, 558) = 2.78, p = .001$. As in the ANOVA results presented above, we report the Pillai's trace value because cell sizes were unequal. Further, Box's test of equality of covariance matrices was significant for both team and error behaviors. For team behaviors, Box's M = 409.35, $F\,(135, 75120.66) = 2.77, p = .000$. For error behaviors, Box's M = 146.54, $F\,(30, 94119.21) = 4.70, p = .000$. These significant Box M test values indicate a violation of the assumption of homogeneity of variance-covariance matrices of the team and error behaviors. Pillai's trace is a conservative test that is most appropriate when this homogeneity assumption is violated.

Since results of the I → I MANCOVAs were significant, we moved to univariate analyses of covariance (ANCOVAs) for team and error behaviors (see Table 28). We report results of these univariate analyses along with significant pairwise comparisons. We found significant results for seven team behaviors. These results are discussed below.

After controlling for knowledge gained during training, assertiveness varied significantly with experimental condition, F (3, 187) = 4.579, p = .004. Using the Bonferroni adjustment for multiple comparisons, participants in single culture American teams (adjusted mean = 17.04) were more assertive than participants in the combined single culture Chinese and mixed culture teams (adjusted mean = 10.69), p = .005.

Backup also varied with experimental condition after controlling for knowledge gained during training, F (3, 187) = 3.89, p = .010. None of the pairwise comparisons was statistically significant, however two sets of comparisons approached the Bonferroni adjusted significance level of .011. Participants in single culture Chinese teams (adjusted mean = 3.63) provided more backup than participants in single culture American teams (adjusted mean = 2.19), p = .022.

Communication varied with experimental condition after controlling for knowledge posttest scores, F (3, 187) = 11.61, p = .000. Participants in single culture American teams (adjusted mean = 27.29) communicated more frequently than participants in the combined single culture Chinese and mixed culture teams (adjusted mean = 13.73), p = .000. Participants in single culture American teams also communicated more frequently than participants in the combination single culture American and mixed culture teams (adjusted mean = 15.37), p = .000. Another pairwise comparison between single culture Chinese condition and the combination single culture Chinese and mixed culture condition nearly reached significance. Participants in single culture Chinese teams (adjusted mean = 21.99) communicated more frequently than participants in the combination single culture Chinese and mixed culture teams (adjusted mean = 13.73), p = .012.

After controlling for the effects of training, coordination varied with experimental condition, F (3, 187) = 14.77, p = .000. Participants in single culture American teams (adjusted mean = 2.66) displayed better coordination than participants in single culture Chinese teams (adjusted mean = 1.73), p = .000. Participants in single culture American teams (adjusted mean = 2.66) were better coordinated compared to participants in the combination single culture Chinese and mixed culture teams (adjusted mean = 1.92), p = .000. Finally, participants in single culture American teams (adjusted mean = 2.66) displayed better coordination than participants in the combination single culture American and mixed culture teams (adjusted mean = 2.17), p = .004. Another pairwise comparison approached statistical significance; participants in the combination single culture American and mixed culture teams (adjusted mean = 2.17) demonstrated better coordination than participants in the combination single culture Chinese and mixed culture teams (adjusted mean = 1.92), p = .020.

Decision making varied with experimental condition after controlling for knowledge gained during training, F (3, 187) = 4.02, p = .008. Participants in single culture American teams (adjusted mean = 2.13) made more decisions than participants in the combination single culture Chinese and mixed culture teams (adjusted mean = .98), p = .006.

Experimental condition differentially affected situational awareness, F (3, 187) = 1.86, p = .000, after controlling for knowledge gained during training. Participants in

single culture American teams (adjusted mean = 6.90) displayed more situational awareness than participants in the combination single culture Chinese and mixed culture teams (adjusted mean = 3.46), $p = .001$. Participants in the combination single culture American and mixed culture teams (adjusted mean = 8.45) demonstrated more situational awareness compared to participants in single culture Chinese teams (adjusted mean = 5.17), $p = .005$. Finally, participants in the combination single culture American and mixed culture teams (adjusted mean = 8.45) displayed more situational awareness than participants in the combination single culture Chinese and mixed culture teams (adjusted mean = 3.46), $p = .000$.

After controlling for knowledge posttest scores, team leadership varied significantly with experimental condition, $F\,(3, 187) = 6.82, p = .000$. Participants in the combination single culture American and mixed culture teams (adjusted mean = 6.96) demonstrated more team leadership than participants in the combination single culture Chinese and mixed culture teams (adjusted mean = 3.14), $p = .001$. Two other pairwise comparisons approached the Bonferroni adjusted significance level of $p = .011$. Participants in the combination single culture American and mixed culture teams (adjusted mean = 6.96) displayed more team leadership than participants in single culture American teams (adjusted mean = 3.88), $p = .014$. Finally, participants in single culture Chinese teams (adjusted mean = 6.22) exhibited more team leadership than participants in the combination single culture Chinese and mixed culture teams (adjusted mean = 3.14), $p = .016$.

Only one error behavior was found to vary significantly with experimental condition after controlling for the effects of training, communication errors, $F\,(3, 187) = 7.78, p = .000$. Participants in single culture Chinese teams (adjusted mean = 1.90) made more communication errors than participants in single culture American teams (adjusted mean = .65), $p = .001$. Participants in the combination single culture Chinese and mixed culture teams (adjusted mean = 1.73) made more communication errors than participants in single culture American teams (adjusted mean = .65), $p = .006$. Also, participants in single culture Chinese teams (adjusted mean = 1.90) made more communication errors than participants in the combination single culture American and mixed culture teams (adjusted mean = .70), $p = .003$. Finally, participants in the combination single culture Chinese and mixed culture teams (adjusted mean = 1.73) made more communication errors than participants in the combination single culture American and mixed culture teams (adjusted mean = .70), $p = .006$.

Team Level of Analysis. There were 149 teams in our sample, so the total N for the team level of analysis was 149. Each team served as an independent observation. We first conducted a multivariate analysis of covariance (MANCOVA) to examine the impact of team type on the combination of team behaviors holding constant flight knowledge gained during training. We repeated this analysis for the combination of error behaviors. Correlations for all variables used in analysis are presented in Table 27. After controlling for knowledge posttest scores, team behaviors were found to vary significantly with experimental condition. Pillai's trace for the multivariate test of experimental condition on the combination of team behaviors was .34, $F\,(18, 276) = 3.15, p = .00$. Similarly, after controlling for knowledge posttest scores, error behaviors varied as a function of experimental condition. Pillai's trace for the multivariate test of experimental condition on the combination of error behaviors was

.14, F (8, 286) = 2.76, p = .006. Consistent with previous sections, we report the Pillai's trace value because cell sizes were unequal. Further, Box's test of equality of covariance matrices was significant for both team and error behaviors. For team behaviors, Box's M = 152.58, F (90, 57346.85) = 1.55, p = .001. For error behaviors, Box's M = 50.68, F (20, 75029.19) = 2.43, p = .000. These significant Box M test values indicate a violation of the assumption of homogeneity of variance-covariance matrices of the team and error behaviors.

Because results of MANCOVAs for team and error behaviors were significant, we move to a discussion of univariate analyses of covariance (ANCOVAs) for team and error behaviors (see Table 28). Only three team behaviors at the team level of analysis were found to vary significantly with experimental condition after controlling for knowledge gained during training. These results are described below.

After controlling for knowledge posttest scores, team coordination varied significantly with experimental condition, F (2, 145) = 11.77, p = .000. Single culture American teams (adjusted mean = 2.58) exhibited better coordination than single culture Chinese teams (adjusted mean = 1.86), p = .000. Also, single culture American teams (adjusted mean = 2.58) displayed better coordination compared to mixed culture teams (adjusted mean = 1.86), p = .000.

Team decision making was found to vary significantly with experimental condition after controlling for the effects of training, F (2, 145) = 6.13, p = .003. Single culture American teams (adjusted mean = 2.12) made more decisions than mixed culture teams (adjusted mean = 1.16), p = .003.

After controlling for knowledge gained during training, situational awareness varied as a function of experimental condition, F (2, 145) = 9.15, p = .000. Single culture American teams (adjusted mean = 8.05) demonstrated more situational awareness than single culture Chinese teams (adjusted mean = 4.03), p = .000.

While not statistically significant, team communication varied with experimental condition after controlling for knowledge posttest scores, F (2, 145) = 4.29, p = .016. This result approaches the adjusted Bonferroni significance level for team behaviors. The difference in adjusted means between single culture American teams (adjusted mean = 21.32) and mixed culture teams (adjusted mean = 14.26) also approaches significance, p = .012. Single culture American teams communicated more frequently than mixed culture teams, although this difference is not quite statistically significant.

Only one error behavior at the T → T level of analysis varied significantly as a function of team type after controlling for knowledge gained during training, communication errors, F (2, 145) = 9.27, p = .000. Single culture Chinese teams (adjusted mean = 1.56) made more communication errors than single culture American teams (adjusted mean = .58), p = .002. Also, mixed culture teams (adjusted mean = 1.55) made more communication errors compared to single culture American teams (adjusted mean = .58), p = .000.

Table 26.
I → I Correlations Between Posttest Knowledge Scores and Team and Error Behaviors

Variable	1	2	3	4	5	6	7	8	9
1. Experimental Condition Dummy Code 1	--								
2. Experimental Condition Dummy Code 2	.02	--							
3. Experimental Condition Dummy Code 3	-.01	.00	--						
4. Posttest Score	-.14*	.19**	.24**	--					
5. Assertiveness	.22**	.07	.13	.12	--				
6. Decision Making	.09	.17*	.22**	.26**	.54**	--			
7. Situational Awareness	.00	.13	.38**	.13	.43**	.44**	--		
8. Team Leadership	-.02	-.13	.30**	.14*	.28**	.22**	.45**	--	
9. Communication	.34**	.17*	.08	.13	.76**	.52**	.21**	.11	--
10. Monitoring	-.11	.00	.11	.09	.33**	.19**	.33**	.54**	.14*
11. Feedback	-.03	.09	-.01	.20**	.05	.00	.05	.01	.04
12. Backup	-.08	-.21**	.09	.00	.08	.10	.25**	.41**	.01
13. Coordination	.08	.43**	.15*	.21**	.25**	.32**	.27**	.02	.26**
14. Non-Compliance Errors	-.06	-.09	-.09	-.09	-.12	-.16*	-.03	.19**	-.20**
15. Communication Errors	.02	-.26**	-.23**	-.08	-.14	-.17*	-.13	.07	-.18*
16. Proficiency Errors	.06	-.07	-.08	.04	-.01	-.03	.20**	-.06	-.07
17. Operational Decision Errors	.02	-.19**	.02	-.01	-.05	-.08	.19**	.19**	-.18*

(Table 26 continues)

Note. N = 196. Team and error behaviors are reported as means for participants who completed two scenarios. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese + mixed culture conditions, -1 = Single culture American + mixed culture conditions, 1= Single culture American condition, and 1 = Single culture Chinese condition. Experimental condition dummy code 2 coded as follows: -1 = Single culture Chinese condition, 1 = Single culture American condition, 0 = Single culture Chinese + mixed culture conditions, and 0 = Single culture American + mixed culture conditions. Experimental condition dummy code 3 coded as follows: -1 = Single culture Chinese + mixed culture conditions, 1 = Single culture American + mixed culture conditions, 0 = Single culture American condition, and 0 = Single culture Chinese condition. * $p \leq .05$. ** $p \leq .01$.

(Table 26 Continued)

Variable	10	11	12	13	14	15	16	17
1. Experimental Condition Dummy Code 1								
2. Experimental Condition Dummy Code 2								
3. Experimental Condition Dummy Code 3								
4. Posttest Score								
5. Assertiveness								
6. Decision Making								
7. Situational Awareness								
8. Team Leadership								
9. Communication								
10. Monitoring	--							
11. Feedback	-.03	--						
12. Backup	.31**	-.08	--					
13. Coordination	.11	.29**	.05	--				
14. Non-Compliance Errors	.19**	-.02	.02	-.15*	--			
15. Communication Errors	.08	-.09	.01	-.35**	.33**	--		
16. Proficiency Errors	-.22**	.06	.02	.02	-.06	.00	--	
17. Operational Decision Errors	.02	-.05	.13	-.18**	.16*	.30**	.44**	--

Note. N = 196. Team and error behaviors are reported as means for participants who completed two scenarios. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese + mixed culture conditions, -1 = Single culture American + mixed culture conditions, 1= Single culture American condition, and 1 = Single culture Chinese condition. Experimental condition dummy code 2 coded as follows: -1 = Single culture Chinese condition, 1 = Single culture American condition, 0 = Single culture Chinese + mixed culture conditions, and 0 = Single culture American + mixed culture conditions. Experimental condition dummy code 3 coded as follows: -1 = Single culture Chinese + mixed culture conditions, 1 = Single culture American + mixed culture conditions, 0 = Single culture American condition, and 0 = Single culture Chinese condition. * $p \leq .05$. ** $p \leq .01$.

Table 27.
T → T Correlations Between Posttest Knowledge Scores and Team and Error Behaviors

Variable	1	2	3	4	5	6	7	8
1. Experimental Condition Dummy Code 1	--							
2. Experimental Condition Dummy Code 2	-.01	--						
3. Posttest Score	.10	.33**	--					
4. Assertiveness	-.14	.14	.10	--				
5. Decision Making	-.15	.29**	.30**	.55**	--			
6. Situational Awareness	-.03	.34**	.09	.42**	.33**	--		
7. Team Leadership	.02	-.01	.16	.27**	.17*	.44**	--	
8. Communication	-.20*	.14	.09	.78**	.51**	.14	.07	--
9. Monitoring	.04	.00	.11	.29**	.14	.29**	.54**	.04
10. Feedback	-.07	.03	.24**	.03	.08	.09	.25**	.07
11. Backup	-.06	-.16	-.08	.04	.11	.15	.17*	.03
12. Coordination	-.18*	.37**	.23**	.29**	.41**	.40**	.15	.26**
13. Non-Compliance Errors	.02	-.12	-.03	-.17*	-.15	.15	.12	-.28**
14. Communication Errors	.18*	-.30**	-.10	-.17*	-.24**	.03	.09	-.22**
15. Proficiency Errors	-.07	-.07	-.02	.05	.03	.34**	.45**	-.13
16. Operational Decision Errors	-.02	-.11	-.01	-.12	-.08	.20*	.34**	-.20*

(Table 27 continues)

Note. N = 149. All variables are means of pilot and copilot scores. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese teams, -1 = Single culture American teams, and 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, and 1 = Single culture American teams. * $p \leq .05$. ** $p \leq .01$.

(Table 27 Continued)

Variable	9	10	11	12	13	14	15	16
1. Experimental Condition Dummy Code 1								
2. Experimental Condition Dummy Code 2								
3. Posttest								
4. Assertiveness								
5. Decision Making								
6. Situational Awareness								
7. Team Leadership								
8. Communication								
9. Monitoring	--							
10. Feedback	.12	--						
11. Backup	.17*	.06	--					
12. Coordination	.17*	.26**	.06	--				
13. Non-Compliance Errors	.09	.08	.00	-.10	--			
14. Communication Errors	.01	-.09	.01	-.38**	.21*	--		
15. Proficiency Errors	.31**	.00	.03	.01	.37**	.33**	--	
16. Operational Decision Errors	.21*	.00	.04	-.18*	.36**	.43**	.56**	--

Note. N = 149. All variables are means of pilot and copilot scores. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese teams, -1 = Single culture American teams, and 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, and 1 = Single culture American teams. * $p \leq .05$. ** $p \leq .01$.

Table 28. *Analysis of Covariance of Team and Error Behaviors as a Function of Experimental Condition With Posttest Knowledge Scores as Covariate*

					I → I							
Team Behavior	Posttest (CV)		Experimental Condition (IV)		Same American Condition		Same Chinese Condition		Same American + Mixed Conditions		Same Chinese + Mixed Conditions	
	F	*p*	F	*p*	M	SE	M	SE	M	SE	M	SE
Assertiveness	3.48	.064	4.58	.004**	17.04[b]	1.35	15.86	1.41	13.25	1.31	10.69[b]	1.30
Backup	.05	.829	3.89	.010**	2.19[†]	.34	3.63[†]	.35	3.53	.33	3.00	.32
Communication	5.07	.026	11.61	.000**	27.29[b, e]	1.87	21.99[†]	1.96	15.37[e]	1.81	13.73[b, †]	1.80
Coordination	3.88	.050	14.77	.000**	2.66[a, b, e]	.10	1.73[a, †]	.11	2.17[e, †]	.10	1.92[b]	.10
Decision Making	9.79	.002**	4.02	.008**	2.13[b]	.25	1.49	.26	1.78	.24	.98[b]	.24
Feedback	6.86	.010**	.40	.757	.37	.11	.27	.11	.27	.10	.39	.10
Monitoring	.72	.397	1.21	.308	1.98	.36	2.05	.38	2.83	.35	2.18	.35
Situational Awareness	.17	.684	10.86	.000*	6.90[b]	.66	5.17[c]	.69	8.45[c, d]	.64	3.46[b, d]	.63
Team Leadership	2.74	.100	6.82	.000**	3.88[†]	.72	6.22[†]	.76	6.96[d, †]	.70	3.14[d, †]	.70
Communication Errors	.04	.835	7.78	.000*	.65[a, b]	.23	1.90[a, c]	.24	.70[c, d]	.22	1.73[b, d]	.22
Non-Compliance Errors	.93	.336	1.03	.379	.89	.26	1.28	.27	1.15	.25	1.52	.25
Operational Decision Errors	.26	.614	2.48	.063	.32	.12	.81	.13	.53	.12	.52	.12
Proficiency Errors	1.80	.181	1.39	.248	2.99	.43	3.72	.45	2.49	.42	3.35	.42

Note. Significance evaluated at * $p \leq .025$ for error behaviors, ** $p \leq .011$ for team behaviors.

[a] Significant difference in adjusted means between single culture American and single culture Chinese conditions, $p \leq .025$ (error behaviors), $p \leq .011$ (team behaviors).

[b] Significant difference in adjusted means between single culture American and single culture Chinese + mixed conditions, $p \leq .025$ (error behaviors), $p \leq .011$ (team behaviors).

[c] Significant difference in adjusted means between single culture Chinese and single culture American + mixed conditions, $p \leq .025$ (error behaviors), $p \leq .011$ (team behaviors).

[d] Significant difference in adjusted means between single culture American + mixed and single culture Chinese + mixed conditions, $p \leq .025$ (error behaviors), $p \leq .011$ (team behaviors).

[e] Significant difference in adjusted means between single culture American and single culture American+ mixed conditions, $p \leq .025$ (error behaviors), $p \leq .011$ (team behaviors).

[†] Denotes result approaching significance. Refer to text for further discussion.

(*Table 28 continued*)

	T -> T									
Team Behavior	Posttest Score (DV)		Team Type (IV)		Same American Condition		Same Chinese Condition		Mixed Culture Condition	
	F	*p*	F	*p*	M	SE	M	SE	M	SE
Assertiveness	.79	.374	2.71	.070	15.44	1.17	13.11	1.22	11.74	1.11
Backup	.10	.754	1.71	.185	2.82	.33	3.66	.34	2.97	.31
Communication	.69	.409	4.29	.016†	21.32†	1.77	17.66	1.85	14.26†	1.67
Coordination	3.07	.082	11.77	.000**	2.58[a, b]	.12	1.86[a]	.13	1.86[b]	.11
Decision Making	9.35	.003**	6.13	.003**	2.12[b]	.21	1.34	.22	1.16[b]	.20
Feedback	10.02	.002	1.02	.364	.33	.11	.45	.11	.24	.10
Monitoring	2.03	.156	.18	.838	2.20	.29	2.41	.30	2.42	.27
Situational Awareness	.12	.728	9.15	.000**	8.05[a]	.64	4.03[a]	.67	5.82	.60
Team Leadership	4.22	.042	.30	.742	4.71	.60	5.39	.62	5.06	.56
Communication Errors	.07	.797	9.27	.000*	.58[a, b]	.18	1.56[a]	.19	1.55[b]	.17
Non-Compliance Errors	.03	.865	1.09	.338	1.01	.20	1.45	.21	1.28	.19
Operational Decision Errors	.13	.723	1.03	.359	.42	.12	.67	.13	.51	.11
Proficiency Errors	.04	.853	.77	.464	2.94	.36	3.41	.37	2.80	.34

Note. Significance evaluated at * $p \leq .025$ for error behaviors, ** $p \leq .011$ for team behaviors.

[a] Significant difference in adjusted means between single culture American and single culture Chinese teams, $p \leq .025$ (error behaviors), $p \leq .011$ (team behaviors).

[b] Significant difference in adjusted means between single culture American and mixed culture teams, $p \leq .025$ (error behaviors), $p \leq .011$ (team behaviors).

† Denotes result approaching significance. Refer to text for further discussion.

Cultural Values

Cultural values measured in our study include Individualism-Collectivism (IC) and Power Distance (PD) Scale (Liang, 1999), the Flight Management Attitudes Questionnaire (FMAQ; Helmriech & Merritt, 1998; Merritt, 1996), and the Schwartz Values Survey (SVS; Schwartz & Bilsky, 1987; Schwartz & Bilsky, 1990). Each of the nine team behaviors and four error behaviors was regressed separately onto each values scale at two different levels of analysis, individual to individual (I → I) and team to team (T → T). The results of these analyses are organized below according to level of analysis, individual and team. Within each level of analysis, we present results for each team behavior as well as each error behavior. Due to the large number of statistical tests, we used Bonferroni adjustment to set the significance level for each test. The adjusted significance levels are as follows: $p \leq .011$ for predicting team behaviors and $p \leq .025$ for predicting error behaviors.

Individual Level of Analysis (I → I). For each team and error behavior we entered the values constructs from each instrument in one step, then we entered the experimental condition variables in a second step. The total N for these analyses is 196. The unit of analysis was the individual. For participants who completed two scenarios, we calculated the mean of each team and error behavior across the scenarios. This mean was used in regression analyses. For participants who completed one scenario, the observed frequency of each team and error behavior was used in regression analysis. Three dummy codes were used to represent the experimental condition: D1 compares single culture condition to single culture + mixed culture conditions, D2 compares single culture American condition with single culture Chinese condition (i.e., for participants who completed only one scenario), and D3 compares single culture American + mixed culture conditions with single culture Chinese + mixed culture conditions (i.e., for participants who completed both scenarios). See Table 29 for correlations at the individual level of analysis.

Assertiveness

In step one of Analysis 1, IC and PD did not explain a significant portion of variance in assertiveness ($R^2 = .01$, *n.s.*; See Table 31). In step two, experimental condition accounted for unique variance in assertiveness, exceeding the Bonferroni adjusted level of significance ($\Delta R^2 = .07, p \leq .011$). Dummy code 1 was significant ($\beta = .23, p = .001$). Participants in single culture American and single culture Chinese teams were more assertive compared to participants in the combination single culture American and mixed culture teams and the combination single culture Chinese and mixed culture teams. The final equation was significant, $F(5, 186) = 3.52, p = .005$.

In step one of Analysis 2, FMAQ failed to explain significant variance in assertiveness ($R^2 = .04$, *n.s.*). The work structure facet of the FMAQ nearly reached the Bonferroni adjusted level of significance ($\beta = -.19, p = .017$). Participants who place less value on an ordered and predictable work environment were more assertive. In step 2, experimental condition explained significantly more variance in assertiveness ($\Delta R^2 = .07, p \leq .011$). Dummy code 1 was significant ($\beta = .23, p = .001$). Participants in the

single culture condition were more assertive than participants who also participated in the mixed condition, that is, participation in the mixed culture condition reduced assertiveness. The final equation was significant, $F(7, 184) = 3.16, p = .004$.

In step one of Analysis 3, Schwartz values did not explain significant variance in assertiveness ($R^2 = .09$, *n.s.*). In step two, experimental condition explained unique variance ($\Delta R^2 = .07, p \leq .011$). Dummy code 1 was a significant predictor ($\beta = .23, p = .001$). Participants in the single culture condition were more assertive than participants who also participated in the mixed condition, that is, participation in the mixed culture condition reduced assertiveness. The final equation was significant, $F(13, 177) = 2.47, p = .004$.

Backup

In step one of Analysis 1, IC and PD did not explain significant variance in backup ($R^2 = .02$, *n.s.*; See Table 32). In step two, experimental condition explained unique variance in backup, approaching the Bonferroni adjusted level of significance ($\Delta R^2 = .05, p = .016$). Dummy code 2 was significant ($\beta = -.20, p = .007$). Participants in single culture Chinese teams demonstrated more backup behavior than participants in single culture American teams. The final equation nearly reached the adjusted Bonferroni significance level, $F(5, 186) = 2.98, p = .013$.

In step one of Analysis 2, FMAQ did not explain significant variance in backup ($R^2 = .03$, *n.s.*). In step 2, experimental condition explained 7 percent of unique variance ($\Delta R^2 = .07, p \leq .011$). Dummy code 2 was significant ($\beta = -.27, p < .001$). Participants in single culture Chinese teams demonstrated more backup than participants in single culture American teams. The final equation was significant, $F(7, 184) = 2.92, p = .006$.

In step one of Analysis 3, Schwartz values failed to explain a significant portion of variance in backup ($R^2 = .07$, *n.s.*). In step two, experimental condition explained 6 percent of additional variance ($\Delta R^2 = .06, p \leq .011$). Dummy code 2 was significant ($\beta = -.25, p = .001$). Participants in single culture Chinese teams demonstrated more backup than participants in single culture American teams. The final equation nearly reached the Bonferroni adjusted level of significance, $F(13, 177) = 2.14, p = .014$.

Communication

In step one of Analysis 1, IC and PD did not explain significant variance in communication ($R^2 = .01$, n.s.; See Table 33). In step two, experimental condition explained significantly more variance ($\Delta R^2 = .15, p \leq .011$). Dummy code 1 ($\beta = .35, p < .001$) was significant. Participants in the single culture condition displayed more communication than participants who also participated in the mixed condition, that is, participation in the mixed culture condition reduced communication. Dummy code 2 approached significance ($\beta = .16, p = .018$). Participants in single culture American teams communicated more than participants in single culture Chinese teams. The final equation was significant, $F(5, 186) = 7.18, p = .000$.

In step one of Analysis 2, FMAQ did not explain a significant portion of variance in communication ($R^2 = .05$, *n.s.*). Work satisfaction was a significant predictor ($\beta = .22$,

$p = .007$). Participants who seek satisfaction from their work communicated more frequently. In step 2, experimental condition accounted for 13 percent of unique variance in communication ($\Delta R^2 = .13, p \leq .011$). Dummy code 1 was significant ($\beta = .34, p < .001$). Participants in the single culture condition displayed more communication than participants who also participated in the mixed condition, that is, participation in the mixed culture condition reduced communication. The overall equation was significant, $F(7, 184) = 5.96, p = .000$.

In step one of Analysis 3, Schwartz values failed to explain significant variance in communication ($R^2 = .08$, *n.s.*). In step two, experimental condition explained significantly more variance ($\Delta R^2 = .14, p \leq .011$). Dummy code 1 was a significant predictor ($\beta = .35, p = .000$). Participants in the single culture condition displayed more communication than participants who also participated in the mixed condition, that is, participation in the mixed culture condition reduced communication. Dummy code 2 approached the Bonferroni adjusted level of significance ($\beta = .16, p = .024$). Participants in single culture American teams communicated more frequently than participants in single culture Chinese teams. The final equation was significant, $F(13, 177) = 3.98, p = .000$.

Coordination

In step one of Analysis 1, IC and PD failed to explain a significant portion of variance in coordination ($R^2 = .00$, n.s.; See Table 34). In step two, experimental condition explained 22 percent of the variance in coordination ($\Delta R^2 = .22, p \leq .011$). Dummy code 2 was significant ($\beta = .44, p = .000$). Participants in single culture American teams displayed better coordination than participants in single culture Chinese teams. Dummy code 3 approached the Bonferroni adjusted level of significance ($\beta = .15, p = .021$). Participants in the combination single culture American and mixed culture teams displayed better coordination than participants in the combination single culture Chinese and mixed culture teams. The overall equation was significant, $F(5, 186) = 10.44, p = .000$.

In step one of Analysis 2, FMAQ constructs explained 8 percent variance in coordination ($R^2 = .08, p \leq .011$). Work satisfaction was significant ($\beta = .24, p = .003$). Participants who seek satisfaction from their work demonstrated better coordination. In step two, experimental condition explained unique variance ($\Delta R^2 = .15, p < .001$). Dummy code 2 was significant ($\beta = .41, p = .000$). Participants in single culture American teams exhibited better coordination than participants in single culture Chinese teams. The final equation was significant, $F(7, 184) = 7.87, p = .000$.

In step one of Analysis 3, Schwartz values did not explain significant variance in backup ($R^2 = .10$, *n.s.*). In step two, experimental condition explained significantly more variance ($\Delta R^2 = .17, p \leq .011$). Dummy code 2 significant ($\beta = .43, p < .001$). Participants in single culture American teams demonstrated better coordination than participants in single culture Chinese teams. The overall equation was significant, $F(13, 177) = 4.99, p = .000$.

Decision Making

In step one of Analysis 1, IC and PD did not explain significant variance in decision making ($R^2 = .03$, n.s.; See Table 35). In step two, experimental condition explained significantly more variance ($\Delta R^2 = .09, p \leq .011$). Dummy code 3 was significant ($\beta = .22, p = .002$). Participants in the combination single culture American and mixed culture teams made more decisions than participants in the combination single culture Chinese and mixed culture teams. Dummy code 2 nearly reached the Bonferroni adjusted level of significance ($\beta = .17, p = .014$). Participants in single culture American teams made more decisions than participants in single culture Chinese teams. The final equation was significant, $F(5, 186) = 4.75, p = .000$.

In step one of Analysis 2, FMAQ explained significant variance in decision making ($R^2 = .11, p \leq .011$). Regression weights for interpersonal relationship quality ($\beta = -.23, p = .003$) and work satisfaction ($\beta = .28, p = .001$) were significant. Participants who place less value on harmonious working relationships made more decisions. Also, participants who seek satisfaction from their work made more decisions. The regression weight for the structure facet ($\beta = -.17, p = .024$) approached the Bonferroni adjusted level of significance. Participants who place less value on an ordered and predictable work environment made more decisions. In step 2, experimental condition did not explain significant variance in decision making ($\Delta R^2 = .03$, *n.s.*). The final equation was significant, $F(7, 184) = 4.24, p = .000$.

In step one of Analysis 3, Schwartz values did not explain significant variance in decision making ($R^2 = .10$, *n.s.*). The regression weight for tradition approached the Bonferroni adjusted level of significance ($\beta = -.23, p = .022$). Participants who place less value on traditional beliefs and customs made more decisions. Experimental condition, entered in step two, explained significant unique variance in decision making ($\Delta R^2 = .06$, $p \leq .011$). Dummy code 3 was a significant predictor ($\beta = .20, p = .009$). Participants in the combination single culture American and mixed culture teams made more decisions than participants in the combination single culture Chinese and mixed culture teams. Dummy code 2 approached the Bonferroni adjusted level of significance ($\beta = .17, p = .022$). Participants in single culture American teams made more decisions than participants in single culture Chinese teams. The final equation was significant, $F(13, 177) = 2.64, p = .002$.

Feedback

In Analysis 1, neither IC/PD ($R^2 = .00$, *n.s.*; See Table 36) nor experimental condition ($\Delta R^2 = .01$, *n.s.;* See Table 36) explained significant variance in feedback. The final equation was not significant, $F(5, 186) = .52, p = .760$.

In Analysis 2, neither FMAQ ($R^2 = .02$, *n.s.*) nor experimental condition ($\Delta R^2 = .01$, *n.s.*) explained a significant portion of variance in feedback. The final equation was not significant, $F(7, 184) = .77, p = .611$.

In Analysis 3, neither Schwartz values ($R^2 = .09$, *n.s.*) nor experimental condition ($\Delta R^2 = .01$, *n.s.*) were significant predictors of feedback. In step one, self-direction ($\beta = -.26, p = .008$) and tradition ($\beta = -.26, p = .010$) were significant predictors. Participants

who place less value on independent thought and action engaged in more feedback. Also, participants who place less value on traditional beliefs and customs demonstrated more feedback. Another predictor, power, approached the Bonferroni adjusted level of significance in step one ($\beta = -.26, p = .023$). Participants who place less value on social status and prestige engaged in more feedback. The overall equation was not significant, $F(13, 177) = 1.42, p = .154$.

Monitoring

In Analysis 1, neither IC/PD ($R^2 = .02$, *n.s.*; See Table 37) nor experimental condition ($\Delta R^2 = .03$, *n.s.*) explained significant variance in monitoring. The final equation was not significant, $F(5, 186) = 1.87, p = .101$.

In Analysis 2, neither FMAQ ($R^2 = .04$, *n.s.*) nor experimental condition ($\Delta R^2 = .02$, *n.s.*) explained a significant portion of variance in monitoring. The overall equation was not significant, $F(7, 184) = 1.53, p = .160$.

In Analysis 3, neither Schwartz values ($R^2 = .08$, *n.s.*) nor experimental condition ($\Delta R^2 = .02$, *n.s.*) explained a significant portion of variance in monitoring. The final equation was not significant, $F(13, 177) = 1.44, p = .146$.

Situational Awareness

In step one of Analysis 1, IC and PD approached the Bonferroni adjusted level of significance ($R^2 = .04, p = .025$; See Table 38). Power distance was a significant predictor ($\beta = -.20, p = .008$). Participants who are less accepting of differences in social status and power (i.e., lower in power distance) displayed more situational awareness. In step two, experimental condition explained 18 percent of unique variance ($\Delta R^2 = .18, p \leq .011$). Dummy code 3 was significant ($\beta = .40, p < .001$). Participants in the combination single culture American and mixed culture teams displayed more situational awareness than participants in the combination single culture Chinese and mixed culture teams. Dummy code 2 approached significance ($\beta = .15, p = .023$). Participants in single culture American teams displayed more situational awareness than participants in single culture Chinese teams. The overall equation was significant, $F(5, 186) = 10.32, p = .000$.

In step one of Analysis 2, FMAQ explained significant variance in situational awareness ($R^2 = .13, p \leq .011$). Work structure ($\beta = -.23, p = .002$) and work satisfaction ($\beta = .30, p = .000$) were significant predictors. Participants who place less value on an ordered and predictable work environment displayed more situational awareness. Also, participants who seek satisfaction from their work demonstrated more situational awareness. Interpersonal relationship quality approached the Bonferroni adjusted level of significance ($\beta = -.17, p = .022$). Participants who place less value on harmonious working relationships demonstrated more situational awareness. In step 2, experimental condition explained unique variance in situational awareness ($\Delta R^2 = .08, p \leq .011$). Dummy code 3 was significant ($\beta = .32, p = .000$). Participants in the combination single culture American and mixed culture teams displayed more situational awareness than participants in the combination single culture Chinese and mixed culture teams. The overall equation was significant, $F(7, 184) = 7.04, p = .000$.

In step one of Analysis 3, Schwartz values explained significant variance in situational awareness ($R^2 = .12, p \leq .011$). The regression weight for power was significant ($\beta = -.35, p = .002$). Participants who place less value on social status and prestige (i.e., lower in power) displayed more situational awareness. The regression weight for benevolence approached the Bonferroni adjusted level of significance ($\beta = -.21, p = .025$). Participants who place less value on enhancing the welfare of others demonstrated more situational awareness. In step two, experimental condition explained significant unique variance in situational awareness ($\Delta R^2 = .10, p \leq .011$). Dummy code 3 was a significant predictor ($\beta = .34, p = .000$). Participants in the combination single culture American and mixed culture teams displayed more situational awareness than participants in the combination single culture Chinese and mixed culture teams. The final equation was significant, $F(13, 177) = 3.67, p = .000$.

Team Leadership

In step one of Analysis 1, IC and PD did not explain significant variance in team leadership ($R^2 = .03$, *n.s.*; See Table 39). In step two, experimental condition explained significantly more variance ($\Delta R^2 = .11, p \leq .011$). Dummy code 3 was significant ($\beta = .32, p < .001$). Participants in the combination single culture American and mixed culture teams displayed more team leadership than participants in the combination single culture Chinese and mixed culture teams. The overall equation was significant, $F(5, 186) = 6.00$, $p = .000$.

In step one of Analysis 2, FMAQ analysis did not explain significant variance in team leadership ($R^2 = .03$, *n.s.*). In step 2, experimental condition explained significantly more variance ($\Delta R^2 = .09, p \leq .011$). Dummy code 3 was significant ($\beta = .25, p = .001$). Participants in the combination single culture American and mixed culture teams exhibited more team leadership than participants in the combination single culture Chinese and mixed culture teams. Dummy code 2 nearly reached the Bonferroni adjusted level of significance ($\beta = -.18, p = .017$). Participants in single culture Chinese teams demonstrated more team leadership than participants in single culture American teams. The final equation was significant, $F(7, 184) = 3.70, p = .001$.

In step one of Analysis 3, Schwartz values did not explain significant variance in team leadership ($R^2 = .05$, *n.s.*). Introduction of experimental condition in step two explained significantly more variance ($\Delta R^2 = .09, p \leq .011$). Dummy code 3 was a significant predictor ($\beta = .27, p = .001$). Participants in the combination single culture American and mixed culture teams displayed more team leadership than participants in the combination single culture Chinese and mixed culture teams. The overall equation was significant, $F(13, 177) = 2.32, p = .007$.

Communication Errors

In step one of Analysis 1, IC and PD failed to explain a significant variance in communication errors ($R^2 = .00$, n.s.; See Table 40). In step two, experimental condition variables explained 12 percent of unique variance in communication errors ($\Delta R^2 = .12, p \leq .011$). Dummy code 2 ($\beta = -.26, p = .000$) and dummy code 3 ($\beta = -.23, p = .001$) were

significant. Participants in single culture Chinese teams made more communication errors than participants in single culture American teams. Also, participants in the combination single culture Chinese and mixed culture teams made more communication errors than participants in the combination single culture American and mixed culture teams. The overall equation was significant, $F(5, 186) = 5.06, p = .000$.

In step one of Analysis 2, FMAQ explained 7 percent of variance in communication errors ($R^2 = .07, p \leq .011$). The regression weight for structure was significant ($\beta = .18, p = .022$). Participants who place more value on an ordered and predictable work environment made more communication errors. In step 2, experimental condition explained unique variance in communication errors ($\Delta R^2 = .08, p \leq .011$). Dummy code 2 ($\beta = -.26, p = .001$) and dummy code 3 ($\beta = -.21, p = .006$) were significant. Participants in single culture Chinese teams made more communication errors than participants in single culture American teams. Also, participants in the combination single culture Chinese and mixed culture teams made more communication errors than participants in the combination single culture American and mixed culture teams. The final equation was significant, $F(7, 184) = 4.44, p = .000$.

In step one of Analysis 1, Schwartz values did not explain significant variance in communication errors ($R^2 = .06$, *n.s.*), although the regression weight for universalism was significant ($\beta = .29, p = .021$). Individuals who hold broad and general rules (as opposed to acknowledging that are exceptions to rules) made more communication errors. In step two, experimental condition explained significant unique variance in communication errors ($\Delta R^2 = .09, p \leq .011$). Regression weights for dummy code 2 ($\beta = -.28, p = .000$) and dummy code 3 ($\beta = -.21, p = .006$) were significant. Participants in single culture Chinese teams made more communication errors than participants in single culture American teams. Also, participants in the combination single culture Chinese and mixed culture teams made more communication errors than participants in the combination single culture American and mixed culture teams. The final equation was significant, $F(13, 177) = 2.41, p = .005$.

Non-Compliance Errors

In Analysis 1, neither IC/PD ($R^2 = .01$, *n.s.*; See Table 41), nor experimental condition ($\Delta R^2 = .02$, *n.s.*) explained significant variance in non-compliance errors. The final equation was not significant, $F(5, 186) = 1.12, p = .351$.

In Analysis 2, neither FMAQ ($R^2 = .03$, *n.s.*) nor experimental condition ($\Delta R^2 = .01$, *n.s.*) explained significant variance in non-compliance errors. The final equation was not significant, $F(7, 184) = 1.14, p = .338$.

In Analysis 3, neither Schwartz values ($R^2 = .03$, *n.s.*) nor experimental condition ($\Delta R^2 = .02$, *n.s.*) explained a significant portion of variance in non-compliance errors. The final equation was not significant, $F(13, 177) = .72, p = .741$.

Operational Decision Errors

In Analysis 1, neither IC/PD (R^2 = .02, *n.s.*; See Table 42) nor experimental condition (ΔR^2 = .03, *n.s.*) explained significant variance in operational decision errors. In step two, the regression weight for dummy code 2 was significant (β = -.18, p = .015). Participants in single culture Chinese teams made more operational decision errors than participants in single culture American teams. The final equation was not significant, $F(5, 186) = 1.97, p = .086$.

In step one of Analysis 2, FMAQ explained significant variance in operational decision errors ($R^2 = .07, p \leq .011$). Task variety and challenge ($\beta = .17, p = .024$) and work satisfaction ($\beta = -.19, p = .020$) facets were significant. Participants who value variety and challenge in their work made more operational decision errors. Participants who value satisfaction from their work made fewer operational decision errors. In step 2, experimental condition did not explain significant unique variance in operational decision errors (ΔR^2 = .04, *n.s.*). Dummy code 2 was significant ($\beta = -.20, p = .010$). Participants in single culture Chinese teams made more operational decision errors than participants in single culture American teams. The final equation was significant, $F(7, 184) = 2.98, p = .006$.

In step one of Analysis 3, Schwartz values did not explain significant variance in operational decision errors (R^2 = .06, *n.s.*). In step two of Analysis 3, experimental condition explained unique variance in operational decision errors ($\Delta R^2 = .05, p \leq .011$). Dummy code 2 was a significant predictor ($\beta = -.24, p = .002$). Participants in single culture Chinese teams made more operational decision errors than participants in single culture American teams. The overall equation was not significant, $F(13, 177) = 1.78, p = .049$.

Proficiency Errors

In Analysis 1, neither IC/PD (R^2 = .01, *n.s.*; See Table 43) nor experimental condition (ΔR^2 = .01, *n.s.*) explained significant variance in proficiency errors. The final equation was not significant, $F(5, 186) = .87, p = .505$.

In Analysis 2, neither FMAQ (R^2 = .01, *n.s.*) nor experimental condition (ΔR^2 = .02, *n.s.*) explained a significant portion of variance in proficiency errors. The overall equation was not significant, $F(7, 184) = .91, p = .502$.

In Analysis 3, neither Schwartz values (R^2 = .09, *n.s.*) nor experimental condition explained significant variance in proficiency errors (ΔR^2 = .01, *n.s.*). The final equation was not significant, $F(13, 177) = 1.61, p = .085$.

Team Level of Analysis (T → T). For the team level of analysis, we aggregated the pilot and copilot scores for each variable by calculating mean scores on all variables. The sample size for this set of analyses is 149. Each team represents an independent observation. For each team and error behavior, we entered the values constructs from each instrument in one step, then we entered the experimental condition variables in a

second step. Given that team, not individual, is the unit of analysis in this section, we used only two experimental condition variables: D1, which compares mixed culture teams to the average of single culture Chinese and single culture American teams, and D2, which compares single culture Chinese teams to single culture American teams. Table 30 contains correlations for all variables used in analysis.

Assertiveness

In Analysis 1, neither IC/PD (R^2 = .03, *n.s.*; See Table 31) nor experimental condition (ΔR^2 = .04, n.s.) explained significant variance in assertiveness. The overall equation was not significant, $F(4, 144) = 2.80, p = .028$.

In Analysis 2, neither FMAQ values (R^2 = .07, *n.s.*) nor experimental condition (ΔR^2 = .03, *n.s.*) explained significant variance in assertiveness. In step one, the structure facet of the FMAQ was a significant predictor ($\beta = -.25, p = .004$). Teams composed of members who place less value on an ordered and predictable work environment displayed more assertiveness. The overall equation approached the Bonferroni adjusted level of significance, $F(6, 142) = 2.60$, p = .020.

In Analysis 3, neither Schwartz values (R^2 = .11, *n.s.*) nor experimental condition (ΔR^2 = .03, *n.s.*) explained significant variance in assertiveness. The final equation was not significant, $F(12, 136) = 1.86, p = .044$.

Backup

In Analysis 1, neither IC /PD (R^2 = .03, *n.s.*; See Table 32) nor experimental condition (ΔR^2 = .02, *n.s.*) explained significant variance in backup. The final equation was not significant, $F(4, 144) = 1.81, p = .130$.

In Analysis 2, neither FMAQ (R^2 = .03, *n.s.*) nor experimental condition explained significant variance in backup (ΔR^2 = .03, *n.s.*). The final equation was not significant, $F(6, 142) = 1.65, p = .138$.

In Analysis 3, neither Schwartz values (R^2 = .08, *n.s.*) nor experimental condition (ΔR^2 = .05, *n.s.*) explained a significant portion of variance in backup. The regression weight for dummy code 2 in step 2 approached the Bonferroni adjusted level of significance ($\beta = -.23, p = .016$). Single culture Chinese teams gave more backup than single culture American teams. The overall equation was not significant, $F(12, 136) = 1.65, p = .086$.

Communication

In step one of Analysis 1, IC and PD did not explain significant variance in communication (R^2 = .01, *n.s.*; See Table 33). In step two of Analysis 1, experimental condition explained more variance, nearly reaching the Bonferroni adjusted level of significance ($\Delta R^2 = .06, p = .014$). The regression weight for dummy code 1 approached significance ($\beta = -.20, p = .016$). Participants in the single culture condition displayed more communication than participants who also participated in the mixed condition, that

is, participation in the mixed culture condition reduced communication. The final equation was not significant, $F(4, 144) = 2.40, p = .052$.

In step one of Analysis 2, FMAQ constructs did not explain significant variance in team communication ($R^2 = .07$, *n.s.*), although the regression weight for work satisfaction was significant ($\beta = .24, p = .008$). Teams with higher mean levels of work satisfaction (i.e., team members place more value on deriving satisfaction from their work) communicated more frequently. In step two, experimental condition did not explain unique variance in communication ($\Delta R^2 = .04$, *n.s.*). Dummy code 1 approached the Bonferroni adjusted level of significance ($\beta = -.19, p = .019$). Participants in the single culture condition displayed more communication than participants who also participated in the mixed condition, that is, participation in the mixed culture condition reduced communication. The overall equation nearly reached the Bonferroni adjusted level of significance, $F(6, 142) = 2.86, p = .012$.

In step one of Analysis 3, Schwartz values did not explain significant variance in backup ($R^2 = .10$, *n.s.*). Experimental condition entered in step two approached the Bonferroni adjusted level of significance ($\Delta R^2 = .05, p = .019$). The regression weight for dummy code 1 nearly reached significance ($\beta = -.20, p = .013$). Participants in the single culture condition displayed more communication than participants who also participated in the mixed condition, that is, participation in the mixed culture condition reduced communication. The final equation approached the Bonferroni adjusted level of significance, $F(12, 136) = 2.07, p = .023$.

Coordination

In step one of Analysis 1, IC and PD did not explain significant variance in team coordination ($R^2 = .01$, *n.s.*; see Table 34). In the step two of Analysis 1, experimental condition explained significantly more variance in team coordination ($\Delta R^2 = .18, p \leq .011$). Dummy code 2 was a significant predictor ($\beta = .39, p = .000$). Single culture American teams demonstrated better coordination than single culture Chinese teams. The regression weight for dummy code 1 approached the Bonferroni adjusted level of significance ($\beta = -.19, p = .015$). Participants in the single culture condition displayed more communication than participants who also participated in the mixed condition, that is, participation in the mixed culture condition reduced communication. The final equation was significant, $F(4, 144) = 8.18, p = .000$.

In step one of Analysis 2, FMAQ explained significant variance in team coordination ($R^2 = .10, p \leq .011$). The regression weight for work satisfaction was significant ($\beta = .26, p = .003$). Teams with members who place more value on deriving satisfaction from their work (i.e., higher mean levels of work satisfaction value) displayed better coordination. In step two, experimental condition explained significant unique variance ($\Delta R^2 = .09, p \leq .011$). Dummy code 1 nearly reached the Bonferroni adjusted level of significance ($\beta = -.19, p = .015$). Participants in the single culture condition displayed more coordination than participants who also participated in the mixed condition, that is, participation in the mixed culture condition reduced coordination. Dummy code 2 was a significant predictor as well ($\beta = .29, p = .003$).

Single culture American teams were better coordinated than single culture Chinese teams. The final equation was significant, $F(6, 142) = 5.57, p = .000$.

Step one of Analysis 3 shows that Schwartz values did not explain significant variance in team coordination ($R^2 = .11$, *n.s.*). Introduction of experimental condition in step two explained significantly more variance ($\Delta R^2 = .11, p \leq .011$). The regression weight for dummy code 1 approached the Bonferroni adjusted level of significance ($\beta = -.18, p = .019$). Participants in the single culture condition displayed more coordination than participants who also participated in the mixed condition, that is, participation in the mixed culture condition reduced coordination. Dummy code 2 was significant ($\beta = .33, p = .000$). Single culture American teams were better coordinated than single culture Chinese teams. The final equation was significant, $F(12, 136) = 3.12, p = .001$.

Decision Making

In step one of Analysis 1, IC and PD did not explain a significant portion of variance in decision making ($R^2 = .04$, *n.s.*; see Table 35). In step two, experimental condition explained unique variance in decision making ($\Delta R^2 = .10, p \leq .011$). Dummy code 2 was a significant predictor ($\beta = .28, p = .001$). Single culture American teams made more decisions than single culture Chinese teams. The overall equation was significant, $F(4, 144) = 5.88, p = .000$.

In step one of Analysis 2, FMAQ explained a significant portion of variance in decision making ($R^2 = .12, p \leq .011$). Structure ($\beta = -.23, p = .007$) and work satisfaction ($\beta = .30, p = .001$) were significant predictors. Teams with members who place more value on an ordered and predictable work environment (i.e., higher mean levels of structure value) made fewer decisions. Also, teams with members who place more value on deriving satisfaction from their work (i.e., higher mean levels of work satisfaction value) made more decisions. In step two of Analysis 2, experimental condition did not explain unique variance in decision making ($\Delta R^2 = .05$, *n.s.*). The overall equation was significant, $F(6, 142) = 4.65, p = .000$.

In step one of Analysis 3, Schwartz values explained 15 percent of variance in team decision making, nearly reaching the Bonferroni adjusted level of significance ($R^2 = .15, p = .012$). The regression weight for tradition approached significance ($\beta = -.25, p = .014$). Teams that placed less value on traditional thought and customs made more decisions. In step two of Analysis 3, experimental condition explained unique variance ($\Delta R^2 = .07, p \leq .011$). Dummy code 2 was significant ($\beta = .25, p = .007$). Single culture American teams made more decisions than single culture Chinese teams. The final equation was significant, $F(12, 136) = 3.14, p = .001$.

Feedback

In Analysis 1, neither IC/PD ($R^2 = .01$, *n.s.*; See Table 36) nor experimental condition ($\Delta R^2 = .01$, *n.s.*) explained significant variance in feedback. The overall equation was not significant, $F(4, 144) = .69, p = .598$.

In Analysis 2, neither FMAQ values (R^2 = .03, *n.s.*) nor experimental condition (ΔR^2 = .01, *n.s.*) explained significant variance in feedback. The final equation was not significant, $F(6, 142) = 1.02, p = .418$.

In Analysis 3, neither Schwartz values (R^2 = .12, *n.s.)* nor experimental condition (ΔR^2 = .01, *n.s.*) explained significant variance in feedback. The regression weight for the tradition facet in step one of Analysis 3 was significant ($\beta = -.28, p = .007$). Teams with lower mean levels of tradition (i.e., members place less value on traditional beliefs and customs) engaged in more feedback. The overall equation was not significant, $F(12, 136) = 1.66, p = .081$.

Monitoring

In step one of Analysis 1, IC and PD explained 6 percent of variance in monitoring ($R^2 = .06, p \leq .011$; See Table 37). The regression weight for power distance was significant ($\beta = -.24, p = .003$). Teams composed of members who are less accepting of differences in social status and power (i.e., lower mean levels of power distance) engaged in more monitoring. In step two of Analysis 1, experimental condition failed to explain additional variance in team monitoring (ΔR^2 = .00, *n.s.*). The final equation was not significant, $F(4, 144) = 2.26, p = .066$.

In Analysis 2, neither FMAQ analysis (R^2 = .03, *n.s.*) nor experimental condition (ΔR^2 = .00, *n.s.*) explained significant variance in monitoring. The overall equation was not significant, $F(6, 142) = .77, p = .596$.

In Analysis 3, neither Schwartz values (R^2 = .06, *n.s.*) nor experimental condition (ΔR^2 = .00, *n.s.*) explained a significant portion of variance in monitoring. The final equation was not significant, $F(12, 136) = .67, p = .782$.

Situational Awareness

Step one of Analysis 1 shows that IC and PD did not explain significant variance in situational awareness (R^2 = .03, *n.s.*; See Table 38). In step two, experimental condition explained unique variance in situational awareness ($\Delta R^2 = .12, p \leq .011$). Dummy code 2 was significant ($\beta = .36, p = .000$). Single culture American teams demonstrated more situational awareness than single culture Chinese teams. The final equation was significant, $F(4, 144) = 6.41, p = .000$.

In step one of Analysis 2, FMAQ values explained a significant portion of variance in situational awareness ($R^2 = .12, p \leq .011$). The work satisfaction facet of the FMAQ was a significant predictor ($\beta = .28, p = .001$). Teams that valued satisfaction from their work had higher situational awareness. Regression weights for interpersonal relationship quality ($\beta = -.20, p = .018$) and structure ($\beta = -.21, p = .014$) approached significance. Teams that placed less value on harmonious working relationships and a predictable work environment displayed more situational awareness. In step two, experimental condition variables did not explain unique variance (ΔR^2 = .04, *n.s.*). The overall equation was significant, $F(6, 142) = 4.56, p = .000$.

In step one of Analysis 3, Schwartz values did not explain significant variance in situational awareness (R^2 = .11, *n.s.*). The regression weight for the power facet approached the Bonferroni adjusted level of significance (β = -.35, p = .014). Teams that placed less value on social status and prestige demonstrated more situational awareness. In step two of Analysis 3, experimental condition explained unique variance (ΔR^2 = .05, p = .020), approaching significance. Dummy code 2 was a significant predictor (β = .26, p = .006). Single culture American teams displayed more situational awareness than single culture Chinese teams. The final equation nearly reached the Bonferroni adjusted level of significance, $F(12, 136) = 2.22, p = .014$.

Team Leadership

In Analysis 1, neither IC/PD (R^2 = .01, *n.s.*; See Table 39) nor experimental condition (ΔR^2 = .00, *n.s.*) explained significant variance in team leadership. The overall equation was not significant, $F(4, 144) = .31, p = .869$.

In Analysis 2, neither FMAQ (R^2 = .01, *n.s.*) nor experimental condition (ΔR^2 = .00, *n.s.*) explained significant variance in team leadership. The final equation was not significant, $F(6, 142) = .15, p = .988$.

In Analysis 3, neither Schwartz values (R^2 = .06, *n.s.*) nor experimental condition (ΔR^2 = .00, *n.s.*) explained significant variance in team leadership. The overall equation was not significant, $F(12, 136) = .66, p = .783$.

Communication Errors

In step one of Analysis 1, IC and PD did not explain a significant portion of variance in communication errors (R^2 = .02, *n.s.*; See Table 40). In step two, experimental condition explained significantly more variance in ($\Delta R^2 = .12, p \leq .011$). Dummy code 1 ($\beta$ = .18, p = .019) and dummy code 2 (β = -.31, p = .000) were significant predictors. Mixed culture teams made more communication errors compared to single culture teams. Single culture Chinese teams made more communication errors than single culture American teams. The overall equation was significant, $F(4, 144) = 6.07, p = .000$.

Step one of Analysis 2 shows that FMAQ constructs explained 8 percent of variance in communication errors ($R^2 = .08, p \leq .025$). Structure (β = .22, p = .010) and work satisfaction (β = -.23, p = .012) were significant predictors. Teams that value an ordered and predictable work environment made more communication errors. Also, teams that value satisfaction from work made fewer communication errors. In step 2 of Analysis 2, experimental condition explained unique variance in team communication errors ($\Delta R^2 = .08, p \leq .011$). Regression weights for dummy code 1 (β = .18, p = .020) and dummy code 2 (β = -.26, p = .008) were significant. Mixed culture teams made more communication errors compared to the single culture teams. Further, single culture Chinese teams made more communication errors than single culture American teams. The R for the complete model was significant, $F(6, 142) = 4.49, p = .000$.

In step one of Analysis 3, Schwartz values explained 15 percent of variance in team communication errors ($R^2 = .15, p \leq .011$). The tradition facet was significant ($\beta = .25, p = .012$). Teams that place more value on traditional beliefs and customs made more communication errors. In step two of Analysis 3, experimental explained significant unique variance in communication errors ($\Delta R^2 = .09, p \leq .011$). Dummy code 1 ($\beta = .18, p = .019$) and dummy code 2 ($\beta = -.28, p = .002$) were significant predictors. Mixed culture teams made more communication errors compared single culture teams. Also, single culture Chinese teams made more communication errors than single culture American teams. The final equation was significant, $F(12, 136) = 3.54, p = .000$.

Non-Compliance Errors

In Analysis1, neither IC/PD ($R^2 = .03$, *n.s.*; See Table 41) nor experimental condition ($\Delta R^2 = .01$, *n.s.*) explained significant variance in non-compliance errors. The final equation was not significant, $F(4, 144) = 1.59, p = .180$.

In Analysis 2, neither FMAQ ($R^2 = .02$, *n.s.*) nor experimental condition ($\Delta R^2 = .01$, *n.s.*) explained significant variance in non-compliance errors. The overall equation was not significant, $F(6, 142) = .68, p = .663$.

In Analysis 3, neither Schwartz values ($R^2 = .12$, *n.s.*) nor experimental condition ($\Delta R^2 = .00$, *n.s.*) explained a significant portion of variance in non-compliance errors. The overall equation was not significant, $F(12, 136) = 1.55, p = .114$.

Operational Decision Errors

In Analysis 1, neither IC/PD ($R^2 = .01$, *n.s.*; See Table 42) nor experimental condition ($\Delta R^2 = .01$, *n.s.*) explained a significant portion of variance in operational decision errors. The final equation was not significant, $F(4, 144) = .77, p = .546$.

Analysis 2 shows that neither FMAQ values ($R^2 = .03$, *n.s.*) nor experimental condition explained a significant portion of variance in team operational decision errors ($\Delta R^2 = .01$, *n.s.*). The overall equation was not significant, $F(6, 142) = 1.12, p = .355$.

In Analysis 3, neither Schwartz ($R^2 = .09$, *n.s.*) nor experimental condition ($\Delta R^2 = .01$, *n.s.*) explained significant variance in operational decision errors. Self-direction was a significant predictor in step one ($\beta = -.26, p = .014$). Teams that place less value on independent thought and action made more operational decision errors. The final equation was not significant, $F(12, 136) = 1.37, p = .189$.

Proficiency Errors

In Analysis 1, neither IC/PD ($R^2 = .00$, *n.s.*; See Table 43) nor experimental condition ($\Delta R^2 = .01$, *n.s.*) explained significant variance in proficiency errors. The final equation was not significant, $F(4, 144) = .48, p = .748$.

In Analysis 2, neither FMAQ ($R^2 = .01$, *n.s.*) nor experimental condition ($\Delta R^2 = .02$, *n.s.*) explained a significant portion of variance in team proficiency errors. The final equation was not significant, $F(6, 142) = .63, p = .704$.

In Analysis 3, neither Schwartz values ($R^2 = .10$, *n.s.*) nor experimental condition ($\Delta R^2 = .01$, *n.s.*) explained significant variance in proficiency errors. The overall equation was not significant, $F(12, 136) = 1.41, p = .167$.

Table 29. *I $\rightarrow$ I Correlations Between Cultural Values (FMAQ, Individualism/Collectivism, Power Distance and Schwartz Values Survey (SVS)) and Team and Error Behaviors*

Variable	1	2	3	4	5	6	7	8	9	10	11
1. Experimental Condition Dummy Code 1	--										
2. Experimental Condition Dummy Code 2	.02	--									
3. Experimental Condition Dummy Code 3	-.01	.00	--								
4. FMAQ Work Satisfaction	.07	.27**	.32**	--							
5. FMAQ Structure	.12	-.01	-.03	.31**	--						
6. FMAQ Interpersonal Relationship Quality	.07	-.12	-.07	.35**	.30**	--					
7. FMAQ Task Variety/Challenge	-.08	.11	.22**	.22**	-.01	.11	--				
8. Individualism/Collectivism	.01	-.07	-.11	.10	.15*	.29**	.19**	--			
9. Power Distance	.10	.07	.03	.10	.31**	.07	-.08	.21**	--		
10. Conformity (SVS)	.09	.15*	.16*	.15*	.13	.09	-.13	.16*	.14	--	
11. Benevolence (SVS)	-.08	.03	.07	-.10	-.07	.04	.01	.19**	.05	.16*	--
12. Tradition (SVS)	.12	-.03	-.07	-.06	.16*	.09	-.08	.17*	.08	.23**	.15*
13. Universalism (SVS)	-.13	-.09	-.06	-.05	-.07	.02	.08	.06	-.25**	-.38**	.14*
14. Self-direction (SVS)	-.07	-.03	.11	-.11	-.27**	-.16*	.19**	-.11	-.13	-.29**	-.05
15. Stimulation (SVS)	.00	.09	.24**	.02	-.07	-.10	.31**	-.15*	-.17*	-.19**	-.22**
16. Hedonism (SVS)	-.07	.05	-.16*	.01	.04	-.03	-.18**	-.16*	.02	-.18*	-.37**

(Table 29 continues)

Note: N = 196. Team and error behaviors are reported as means for participants who completed two scenarios. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese and mixed culture conditions, -1 = Single culture American and mixed culture conditions, 1= Single culture American condition, and 1 = Single culture Chinese condition. Experimental condition dummy code 2 coded as follows: 0 = Single culture American and mixed culture conditions, 0 = Single culture Chinese and mixed culture conditions, -1 = Single culture Chinese condition, and 1 = Single culture American condition. Experimental condition dummy code 3 coded as follows: 0 = Single culture American condition, 0 = Single culture Chinese condition, -1 = Single culture Chinese and mixed culture conditions, and 1 = Single culture American and mixed culture conditions. * $p \leq .05$. ** $p \leq .01$.

(Table 29 Continued)

Variable	12	13	14	15	16	17	18	19	20	21	22
1. Experimental Condition Dummy Code 1											
2. Experimental Condition Dummy Code 2											
3. Experimental Condition Dummy Code 3											
4. FMAQ Work Satisfaction											
5. FMAQ Structure											
6. FMAQ Interpersonal Relationship Quality											
7. FMAQ Task Variety/Challenge											
8. Individualism/Collectivism											
9. Power Distance											
10. Conformity (SVS)											
11. Benevolence (SVS)											
12. Tradition (SVS)	--										
13. Universalism (SVS)	-.08	--									
14. Self-direction (SVS)	-.37**	.12	--								
15. Stimulation (SVS)	-.29**	-.02	.22**	--							
16. Hedonism (SVS)	-.31**	-.22**	.00	.09	--						

(Table 29 continues)

Note: N = 196. Team and error behaviors are reported as means for participants who completed two scenarios. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese and mixed culture conditions, -1 = Single culture American and mixed culture conditions, 1= Single culture American condition, and 1 = Single culture Chinese condition. Experimental condition dummy code 2 coded as follows: 0 = Single culture American and mixed culture conditions, 0 = Single culture Chinese and mixed culture conditions, -1 = Single culture Chinese condition, and 1 = Single culture American condition. Experimental condition dummy code 3 coded as follows: 0 = Single culture American condition, 0 = Single culture Chinese condition, -1 = Single culture Chinese and mixed culture conditions, and 1 = Single culture American and mixed culture conditions. * $p \leq .05$. ** $p \leq .01$.

(Table 29 Continued)

Variable	1	2	3	4	5	6	7	8	9	10	11
17. Achievement (SVS)	.04	.16*	.09	.07	-.03	-.05	.21**	-.02	-.03	.04	-.19**
18. Power (SVS)	.07	-.18*	-.23**	-.04	.21**	.08	-.27**	-.12	.18*	-.06	-.43**
19. Security (SVS)	-.03	.10	-.06	.06	.12	-.08	-.12	.09	.30**	.12	.00
20. Assertiveness	.22**	.07	.13	.09	-.13	.06	.08	-.09	-.07	-.09	-.18*
21. Decision Making	.09	.17*	.22**	.14*	-.15*	-.18**	.05	-.13	-.11	.06	-.12
22. Situational Awareness	.00	.13	.38**	.18*	-.19**	-.13	.12	-.04	-.17*	.10	-.04
23. Team Leadership	-.02	-.13	.30**	.14	.02	-.04	.03	.04	-.13	.03	-.01
24. Communication	.34**	.17*	.08	.17*	-.06	.08	-.03	-.09	-.03	-.03	-.18*
25. Monitoring	-.11	.00	.11	.16*	.02	.00	.10	.03	-.14*	-.04	-.12
26. Feedback	-.03	.09	-.01	.01	-.07	.05	.10	-.02	-.07	-.09	.07
27. Backup	-.08	-.21**	.09	.04	-.14*	-.02	.02	.04	-.13	.06	-.01
28. Coordination	.08	.43**	.15*	.17*	-.09	-.07	.14*	-.03	-.02	-.01	.06
29. Non-Compliance Errors	-.06	-.09	-.09	-.03	.13	.04	-.09	.05	.07	.03	.05
30. Communication Errors	.02	-.26**	-.23**	-.12	.14*	.02	-.16*	.00	-.03	-.04	-.03
31. Proficiency Errors	.06	-.07	-.08	-.05	-.06	-.04	.07	.09	-.01	-.11	.09
32. Operational Decision Errors	.02	-.19**	.02	-.17*	-.03	-.14*	.10	.09	-.06	-.12	.04

(Table 29 continues)

Note: N = 196. Team and error behaviors are reported as means for participants who completed two scenarios. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese and mixed culture conditions, -1 = Single culture American and mixed culture conditions, 1= Single culture American condition, and 1 = Single culture Chinese condition. Experimental condition dummy code 2 coded as follows: 0 = Single culture American and mixed culture conditions, 0 = Single culture Chinese and mixed culture conditions, -1 = Single culture Chinese condition, and 1 = Single culture American condition. Experimental condition dummy code 3 coded as follows: 0 = Single culture American condition, 0 = Single culture Chinese condition, -1 = Single culture Chinese and mixed culture conditions, and 1 = Single culture American and mixed culture conditions. * $p \leq .05$. ** $p \leq .01$.

(Table 29 Continued)

Variable	12	13	14	15	16	17	18	19	20	21	22
17. Achievement (SVS)	-.24**	-.38**	.08	.06	.05	--					
18. Power (SVS)	-.05	-.47**	-.29**	-.09	.29**	.09	--				
19. Security (SVS)	-.03	-.11	-.29**	-.30**	-.05	-.13	.06	--			
20. Assertiveness	-.21**	-.04	.15*	.15*	.12	.10	.00	-.06	--		
21. Decision Making	-.19**	-.02	.15*	.09	.02	.15*	-.08	-.12	.54**	--	
22. Situational Awareness	-.11	.02	.10	.10	-.06	.09	-.23**	.01	.43**	.44**	--
23. Team Leadership	-.12	.05	.13	.06	.01	.04	-.16*	-.06	.28**	.22**	.45**
24. Communication	-.18*	-.13	.04	.13	.07	.16*	.09	.04	.76**	.52**	.21**
25. Monitoring	-.21**	.02	.10	.09	.10	.15*	-.02	-.08	.33**	.19**	.33**
26. Feedback	-.13	.12	-.05	.02	.00	.04	-.13	-.02	.05	.00	.05
27. Backup	-.17*	.15*	.05	.04	-.01	-.03	-.10	.01	.08	.10	.25**
28. Coordination	-.09	-.04	.08	.13	-.06	.20**	-.16*	-.05	.25**	.32**	.27**
29. Non-Compliance Errors	.05	.04	-.13	-.05	-.01	-.02	.06	-.01	-.12	-.16*	-.03
30. Communication Errors	.05	.12	-.06	-.13	.01	-.04	.08	.06	-.14	-.17*	-.13
31. Proficiency Errors	.10	.19**	-.13	-.09	-.01	-.11	-.11	.04	-.01	-.03	.20**
32. Operational Decision Errors	-.04	.15*	-.07	.05	-.03	.02	-.12	.02	-.05	-.08	.19**

(Table 29 continues)

Note: N = 196. Team and error behaviors are reported as means for participants who completed two scenarios. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese and mixed culture conditions, -1 = Single culture American and mixed culture conditions, 1= Single culture American condition, and 1 = Single culture Chinese condition. Experimental condition dummy code 2 coded as follows: 0 = Single culture American and mixed culture conditions, 0 = Single culture Chinese and mixed culture conditions, -1 = Single culture Chinese condition, and 1 = Single culture American condition. Experimental condition dummy code 3 coded as follows: 0 = Single culture American condition, 0 = Single culture Chinese condition, -1 = Single culture Chinese and mixed culture conditions, and 1 = Single culture American and mixed culture conditions. * $p \leq .05$. ** $p \leq .01$.

(Table 29 Continued)

Variable	23	24	25	26	27	28	29	30	31	32
17. Achievement (SVS)										
18. Power (SVS)										
19. Security (SVS)										
20. Assertiveness										
21. Decision Making										
22. Situational Awareness										
23. Team Leadership	--									
24. Communication	.11	--								
25. Monitoring	.54**	.14*	--							
26. Feedback	.01	.04	-.03	--						
27. Backup	.41**	.01	.31**	-.08	--					
28. Coordination	.02	.26**	.11	.29**	.05	--				
29. Non-Compliance Errors	.19**	-.20**	.19**	-.02	.02	-.15*	--			
30. Communication Errors	.07	-.18*	.08	-.09	.01	-.35**	.33**	--		
31. Proficiency Errors	-.06	-.07	-.22**	.06	.02	.02	-.06	.00	--	
32. Operational Decision Errors	.19**	-.18*	.02	-.05	.13	-.18**	.16*	.30**	.44**	--

Note: N = 196. Team and error behaviors are reported as means for participants who completed two scenarios. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese and mixed culture conditions, -1 = Single culture American and mixed culture conditions, 1= Single culture American condition, and 1 = Single culture Chinese condition. Experimental condition dummy code 2 coded as follows: 0 = Single culture American and mixed culture conditions, 0 = Single culture Chinese and mixed culture conditions, -1 = Single culture Chinese condition, and 1 = Single culture American condition. Experimental condition dummy code 3 coded as follows: 0 = Single culture American condition, 0 = Single culture Chinese condition, -1 = Single culture Chinese and mixed culture conditions, and 1 = Single culture American and mixed culture conditions. * $p \leq .05$. ** $p \leq .01$.

Table 30. *T → T Correlations Between Cultural Values (FMAQ, IC, PD, and Schwartz Values Survey (SVS)) and Team and Error Behaviors*

Variable	1	2	3	4	5	6	7	8	9	10
1. Experimental Condition Dummy Code 1	--									
2. Experimental Condition Dummy Code 2	-.01	--								
3. FMAQ Work Satisfaction	-.05	.49**	--							
4. FMAQ Structure	-.06	-.03	.28**	--						
5. FMAQ Interpersonal Relationship Quality	-.04	-.15	.28**	.21*	--					
6. FMAQ Task Variety/Challenge	.05	.26**	.24**	-.08	.12	--				
7. Individualism/Collectivism	.00	-.15	.09	.12	.30**	.17*	--			
8. Power Distance	-.07	.09	.14	.42**	.06	-.17*	.20*	--		
9. Conformity (SVS)	-.05	.25**	.13	.15	.01	-.06	.12	.21*	--	
10. Benevolence (SVS)	.03	.07	-.06	-.08	.04	.15	.27**	.06	.21**	--
11. Tradition (SVS)	-.06	-.09	.00	.30**	.13	-.05	.25**	.23**	.25**	.10
12. Universalism (SVS)	.08	-.12	.02	-.08	.13	.06	.12	-.21**	-.37**	.19*
13. Self-Direction (SVS)	.02	.07	-.07	-.27**	-.11	.20*	-.15	-.20*	-.24**	.00
14. Stimulation (SVS)	-.01	.26**	.00	-.05	-.15	.30**	-.15	-.17*	-.13	-.16
15. Hedonism (SVS)	.05	-.09	-.03	-.06	-.07	-.24**	-.15	-.02	-.27**	-.43**

(Table 30 continues)

Note: N = 149. All cultural values and team/error behaviors are means of pilot and copilot scores on these variables. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese teams, -1 = Single culture American teams, and 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, and 1 = Single culture American teams. * $p \leq .05$. ** $p \leq .01$.

(Table 30 Continued)

Variable	11	12	13	14	15	16	17	18	19	20
1. Experimental Condition Dummy Code 1										
2. Experimental Condition Dummy Code 2										
3. FMAQ Work Satisfaction										
4. FMAQ Structure										
5. FMAQ Interpersonal Relationship Quality										
6. FMAQ Task Variety/Challenge										
7. Individualism/Collectivism										
8. Power Distance										
9. Conformity (SVS)										
10. Benevolence (SVS)										
11. Tradition (SVS)	--									
12. Universalism (SVS)	.00	--								
13. Self-Direction (SVS)	-.27**	.08	--							
14. Stimulation (SVS)	-.28**	-.11	.22**	--						
15. Hedonism (SVS)	-.27**	-.23**	-.04	.02	--					

(Table 30 continues)

Note: N = 149. All cultural values and team/error behaviors are means of pilot and copilot scores on these variables. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese teams, -1 = Single culture American teams, and 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, and 1 = Single culture American teams. * $p \leq .05$. ** $p \leq .01$.

(Table 30 Continued)

Variable	1	2	3	4	5	6	7	8	9	10
16. Achievement (SVS)	-.04	.20*	.06	-.09	-.06	.22**	-.03	-.03	.07	-.13
17. Power (SVS)	-.01	-.31**	-.12	.21*	.00	-.36**	-.17*	.14	-.06	-.54**
18. Security (SVS)	.00	.03	.14	.21*	-.09	-.15	.08	.28**	.05	.08
19. Assertiveness	-.14	.14	.12	-.18*	.04	-.01	-.14	-.13	-.09	-.20*
20. Decision Making	-.15	.29**	.18*	-.18*	-.14	.05	-.18*	-.11	.07	-.11
21. Situational Awareness	-.03	.34**	.18*	-.17*	-.16	.10	-.09	-.15	.13	.00
22. Team Leadership	.02	-.01	.03	.01	-.01	-.05	.01	-.09	-.02	.00
23. Communication	-.20*	.14	.19*	-.08	.09	-.02	-.07	-.02	-.09	-.20*
24. Monitoring	.04	.00	-.06	-.13	-.04	.11	-.02	-.24**	-.11	-.01
25. Feedback	-.07	.03	.06	-.13	.01	.11	-.02	-.11	-.12	.08
26. Backup	-.06	-.16	-.06	-.16*	.02	-.02	.10	-.10	.05	.04
27.Coordination	-.18*	.37**	.21*	-.11	-.09	.17*	-.02	-.08	-.02	.06
28. Non-Compliance Errors	.02	-.12	-.06	.07	-.01	.03	.14	.12	-.07	.04
29.Communication Errors	.18*	-.30**	-.17*	.17*	.00	-.12	.11	.11	-.01	.10
30. Proficiency Errors	-.07	-.07	.05	.05	-.02	-.01	.01	.05	-.10	.08
31. Operational Decision Errors	-.02	-.11	-.10	.05	-.11	.03	.10	.04	-.14	.06

(Table 30 continues)

Note: N = 149. All cultural values and team/error behaviors are means of pilot and copilot scores on these variables. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese teams, -1 = Single culture American teams, and 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, and 1 = Single culture American teams. * $p \leq .05$. ** $p \leq .01$.

(Table 30 Continued)

Variable	11	12	13	14	15	16	17	18	19	20
16. Achievement (SVS)	-.14	-.41**	.01	-.02	.03	--				
17. Power (SVS)	-.03	-.46**	-.29**	-.09	.29**	.02	--			
18. Security (SVS)	-.12	-.08	-.30**	-.21**	.00	-.07	.04	--		
19. Assertiveness	-.23**	-.05	.15	.15	.14	.08	.02	-.07	--	
20. Decision Making	-.22**	-.02	.20*	.12	.07	.11	-.10	-.15	.55**	--
21. Situational Awareness	-.10	.02	.03	.08	-.02	.08	-.22**	.04	.42**	.33**
22. Team Leadership	-.08	.09	-.11	-.02	.13	-.06	-.02	.04	.27**	.17*
23. Communication	-.23**	-.09	.06	.18*	.10	.12	.08	.04	.78**	.51**
24. Monitoring	-.14	.05	.00	.02	.15	.07	-.05	-.02	.29**	.14
25. Feedback	-.17*	.12	-.07	-.02	.00	.08	-.14	-.02	.03	.08
26. Backup	-.16	.12	-.08	-.01	.03	-.08	-.02	.05	.04	.11
27.Coordination	-.10	.00	.12	.17*	-.06	.19*	-.21*	-.07	.29**	.41**
28. Non-Compliance Errors	.17*	.15	-.21**	.00	-.04	-.16	.03	-.03	-.17*	-.15
29.Communication Errors	.25**	.15	-.23**	-.17*	-.08	-.14	.04	.12	-.17*	-.24**
30. Proficiency Errors	.06	.22**	-.16	-.17*	-.01	-.06	-.07	.05	.05	.03
31. Operational Decision Errors	.04	.16	-.16*	-.01	-.06	-.01	-.09	.06	-.12	-.08

(Table 30 continues)

Note: N = 149. All cultural values and team/error behaviors are means of pilot and copilot scores on these variables. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese teams, -1 = Single culture American teams, and 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, and 1 = Single culture American teams. * $p \leq .05$. ** $p \leq .01$.

(Table 30 Continued)

Variable	21	22	23	24	25	26	27	28	29	30	31
16. Achievement (SVS)											
17. Power (SVS)											
18. Security (SVS)											
19. Assertiveness											
20. Decision Making											
21. Situational Awareness	--										
22. Team Leadership	.44**	--									
23. Communication	.14	.07	--								
24. Monitoring	.29**	.54**	.04	--							
25. Feedback	.09	.25**	.07	.12	--						
26. Backup	.15	.17*	.03	.17*	.06	--					
27.Coordination	.40**	.15	.26**	.17*	.26**	.06	--				
28. Non-Compliance Errors	.15	.12	-.28**	.09	.08	.00	-.10	--			
29.Communication Errors	.03	.09	-.22**	.01	-.09	.01	-.38**	.21*	--		
30. Proficiency Errors	.34**	.45**	-.13	.31**	.00	.03	.01	.37**	.33**	--	
31. Operational Decision Errors	.20*	.34**	-.20*	.21*	.00	.04	-.18*	.36**	.43**	.56**	--

Note: N = 149. All cultural values and team/error behaviors are means of pilot and copilot scores on these variables. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese teams, -1 = Single culture American teams, and 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, and 1 = Single culture American teams. * $p \leq .05$. ** $p \leq .01$.

Table 31. *Multiple Regression Results for Values and Experimental Condition Predicting Assertiveness at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – I/C and PD								
Step 1	I/C and PD Variables								
	I→I: $R^2 = .01$								
	T→T: $R^2 = .03$								
	Individualism/ Collectivism	-1.51	1.30	-.09	.248	-2.47	1.75	-.12	.159
	Power Distance	-1.15	1.26	-.07	.364	-2.23	1.72	-.11	.197
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .07$*								
	T→T: $\Delta R^2 = .04$								
	Experimental Condition[a] (Dummy Code 1)	2.17	.67	.23	.001*	-.85	.45	-.15	.063
	Experimental Condition[b] (Dummy Code 2)	.99	.97	.07	.310	1.40	.82	.14	.091
	Experimental Condition[c] (Dummy Code 3)	1.66	.92	.13	.072	N/A	N/A	N/A	N/A
	Analysis 2 – FMAQ Work Values								
Step 1	FMAQ Variables								
	I→I: $R^2 = .04$								
	T→T: $R^2 = .07$								
	Interpersonal Relationship Quality	.94	.88	.08	.286	.65	1.11	.05	.559
	Structure	-2.29	.95	-.19	.017†	-3.81	1.29	-.25	.004*
	Task Variety and Challenge	.34	.85	.03	.685	-1.11	1.14	-.08	.330
	Work Satisfaction	1.66	1.16	.12	.152	3.51	1.61	.19	.031

(Table 31 continues)

(Table 31 continued)

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .07$* T→T: $\Delta R^2 = .03$								
	Experimental Condition[a] (Dummy Code 1)	2.18	.67	.23	.001*	-.80	.45	-.14	.077
	Experimental Condition[b] (Dummy Code 2)	.92	1.05	.07	.380	1.05	1.01	.10	.301
	Experimental Condition[c] (Dummy Code 3)	1.51	1.01	.12	.136	N/A	N/A	N/A	N/A
	Analysis 3 – Schwartz Cultural Values								
Step 1	Schwartz Cultural Values Predictors I→I: $R^2 = .09$ T→T: $R^2 = .11$								
	Achievement	-.58	1.15	-.05	.613	-.47	1.61	-.03	.772
	Benevolence	-2.98	1.38	-.20	.032	-4.13	1.97	-.24	.037
	Conformity	-.74	1.04	-.07	.480	-.40	1.45	-.03	.785
	Hedonism	-.09	.74	-.01	.900	-.09	1.05	-.01	.934
	Power	-1.11	.81	-.15	.170	-1.32	1.15	-.16	.253
	Security	-.90	1.15	-.07	.434	-1.17	1.53	-.07	.445
	Self-Direction	-.08	1.23	-.01	.948	.36	1.78	.02	.839
	Stimulation	.00	.67	.00	.998	-.03	.89	.00	.975
	Tradition	-2.20	1.11	-.20	.049	-3.07	1.49	-.21	.042
	Universalism	-1.90	1.56	-.15	.223	-1.73	2.18	-.12	.429

(Table 31 continues)

(Table 31 continued)

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .07$* T→T: $\Delta R^2 = .03$								
	Experimental Condition[a] (Dummy Code 1)	2.21	.67	.23	.001*	-.84	.45	-.15	.065
	Experimental Condition[b] (Dummy Code 2)	.98	1.03	.07	.344	1.34	.94	.13	.158
	Experimental Condition[c] (Dummy Code 3)	1.68	1.00	.13	.094	N/A	N/A	N/A	N/A

Note. I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .01$.

[a]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c]Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 32. *Multiple Regression Results for Values and Experimental Condition Predicting Backup at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – I/C and PD								
Step 1	I/C and PD Variables I→I: $R^2 = .02$ T→T: $R^2 = .03$								
	Individualism/ Collectivism	.33	.32	.08	.305	.74	.48	.13	.130
	Power Distance	-.60	.31	-.14	.055	-.73	.48	-.13	.130
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .05^{\dagger}$ T→T: $\Delta R^2 = .02$								
	Experimental Condition[a] (Dummy Code 1)	-.15	.16	-.07	.348	-.11	.13	-.07	.404
	Experimental Condition[b] (Dummy Code 2)	-.66	.24	-.20	.007*	-.38	.23	-.14	.105
	Experimental Condition[c] (Dummy Code 3)	.32	.23	.10	.162	N/A	N/A	N/A	N/A
	Analysis 2 – FMAQ Work Values								
Step 1	FMAQ Variables I→I: $R^2 = .03$ T→T: $R^2 = .03$								
	Interpersonal Relationship Quality	-.02	.22	-.01	.911	.26	.31	.07	.408
	Structure	-.52	.24	-.17	.029	-.72	.36	-.17	.049
	Task Variety and Challenge	.00	.21	.00	.988	-.13	.32	-.04	.683
	Work Satisfaction	.34	.29	.10	.236	-.13	.46	-.03	.772

(Table 32 continues)

(Table 32 continued)

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .07$* T→T: $\Delta R^2 = .03$								
	Experimental Condition[a] (Dummy Code 1)	-.15	.16	-.07	.358	-.11	.13	-.07	.403
	Experimental Condition[b] (Dummy Code 2)	-.92	.26	-.27	.000*	-.59	.29	-.21	.040
	Experimental Condition[c] (Dummy Code 3)	.05	.25	.02	.841	N/A	N/A	N/A	N/A
	Analysis 3 – Schwartz Cultural Values								
Step 1	Schwartz Cultural Values Predictors I→I: $R^2 = .07$ T→T: $R^2 = .08$								
	Achievement	-.13	.28	-.04	.657	-.14	.45	-.03	.755
	Benevolence	-.31	.34	-.08	.367	.17	.55	.04	.756
	Conformity	.43	.26	.16	.093	.62	.41	.17	.128
	Hedonism	-.05	.18	-.03	.782	.15	.29	.06	.606
	Power	-.09	.20	-.05	.654	.11	.32	.05	.730
	Security	-.04	.28	-.01	.876	-.05	.43	-.01	.898
	Self-Direction	-.09	.30	-.03	.756	-.51	.50	-.11	.309
	Stimulation	-.02	.17	-.01	.924	.01	.25	.00	.978
	Tradition	-.57	.27	-.21	.037	-.88	.42	-.22	.037
	Universalism	.51	.39	.16	.188	.86	.61	.21	.160

(Table 32 continues)

(Table 32 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .06$*								
	T→T: $\Delta R^2 = .05$								
	Experimental Condition[a] (Dummy Code 1)	-.12	.17	-.05	.467	-.13	.13	-.08	.317
	Experimental Condition[b] (Dummy Code 2)	-.85	.26	-.25	.001*	-.64	.26	-.23	.016†
	Experimental Condition[c] (Dummy Code 3)	.13	.25	.04	.592	N/A	N/A	N/A	N/A

Note. I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .01$.

[a]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c]Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 33. *Multiple Regression Results for Values and Experimental Condition Predicting Communication at Individual and Team Levels of Analysis*

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Analysis 1 – I/C and PD								
Step 1	I/C and PD Variables I→I: $R^2 = .01$ T→T: $R^2 = .01$								
	Individualism/ Collectivism	-2.35	1.90	-.09	.218	-2.27	2.70	-.07	.402
	Power Distance	-.24	1.84	-.01	.897	-.08	2.66	.00	.976
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .15$* T→T: $\Delta R^2 = .06^{\dagger}$								
	Experimental Condition[a] (Dummy Code 1)	4.84	.93	.35	.000*	-1.70	.70	-.20	.016†
	Experimental Condition[b] (Dummy Code 2)	3.25	1.36	.16	.018†	2.14	1.27	.14	.093
	Experimental Condition[c] (Dummy Code 3)	1.43	1.28	.08	.263	N/A	N/A	N/A	N/A
	Analysis 2 – FMAQ Work Values								
Step 1	FMAQ Variables I→I: $R^2 = .05$ T→T: $R^2 = .07$								
	Interpersonal Relationship Quality	.78	1.27	.05	.539	1.42	1.70	.07	.404
	Structure	-2.54	1.38	-.14	.067	-4.00	1.97	-.17	.045
	Task Variety and Challenge	-1.37	1.23	-.08	.264	-1.95	1.74	-.09	.263
	Work Satisfaction	4.56	1.67	.22	.007*	6.65	2.47	.24	.008*

(Table 33 continues)

(Table 33 continued)

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .13$* T→T: $\Delta R^2 = .04$								
	Experimental Condition[a] (Dummy Code 1)	4.71	.93	.34	.000*	-1.62	.69	-.19	.019[†]
	Experimental Condition[b] (Dummy Code 2)	2.84	1.46	.14	.053	1.29	1.54	.08	.403
	Experimental Condition[c] (Dummy Code 3)	1.05	1.40	.06	.455	N/A	N/A	N/A	N/A
	Analysis 3 – Schwartz Cultural Values								
Step 1	Schwartz Cultural Values Predictors I→I: $R^2 = .08$ T→T: $R^2 = .10$								
	Achievement	1.03	1.67	.06	.538	1.62	2.46	.07	.513
	Benevolence	-3.45	2.01	-.16	.087	-4.58	3.01	-.18	.130
	Conformity	-.64	1.52	-.04	.674	-.68	2.22	-.03	.761
	Hedonism	-.68	1.07	-.06	.525	-.59	1.60	-.04	.712
	Power	-.32	1.17	-.03	.787	-.36	1.77	-.03	.839
	Security	.51	1.68	.03	.764	1.51	2.34	.06	.520
	Self-Direction	-.80	1.79	-.04	.656	-.04	2.72	.00	.989
	Stimulation	.62	.98	.06	.523	1.40	1.36	.10	.305
	Tradition	-2.47	1.61	-.15	.128	-3.69	2.29	-.17	.110
	Universalism	-2.33	2.27	-.12	.306	-1.08	3.34	-.05	.747

(Table 33 continues)

(Table 33 continued)

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *P*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .14$* T→T: $\Delta R^2 = .05^{\dagger}$								
	Experimental Condition[a] (Dummy Code 1)	4.82	.94	.35	.000*	-1.72	.69	-.20	.013†
	Experimental Condition[b] (Dummy Code 2)	3.26	1.43	.16	.024†	2.00	1.43	.13	.165
	Experimental Condition[c] (Dummy Code 3)	1.72	1.39	.09	.218	N/A	N/A	N/A	N/A

Note. I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .01$.

[a]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c]Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 34. *Multiple Regression Results for Values and Experimental Condition Predicting Coordination at Individual and Team Levels of Analysis*

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Analysis 1 – I/C and PD								
Step 1	I/C and PD Variables								
	I→I: $R^2 = .00$								
	T→T: $R^2 = .01$								
	Individualism/ Collectivism	-.07	.11	-.05	.510	-.02	.20	-.01	.919
	Power Distance	.01	.11	.01	.937	-.18	.19	-.08	.364
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .22$*								
	T→T: $\Delta R^2 = .18$*								
	Experimental Condition[a] (Dummy Code 1)	.06	.05	.08	.221	-.12	.05	-.19	.015[†]
	Experimental Condition[b] (Dummy Code 2)	.50	.07	.44	.000*	.44	.09	.39	.000*
	Experimental Condition[c] (Dummy Code 3)	.16	.07	.15	.021[†]	N/A	N/A	N/A	N/A
	Analysis 2 – FMAQ Work Values								
Step 1	FMAQ Variables								
	I→I: $R^2 = .08$*								
	T→T: $R^2 = .10$*								
	Interpersonal Relationship Quality	-.14	.07	-.15	.047	-.22	.12	-.15	.077
	Structure	-.12	.08	-.12	.116	-.24	.14	-.14	.089
	Task Variety and Challenge	.09	.07	.10	.176	.16	.12	.11	.189
	Work Satisfaction	.29	.09	.24	.003*	.53	.18	.26	.003*

(Table 34 continues)

(Table 34 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .15$* T→T: $\Delta R^2 = .09$*								
	Experimental Condition[a] (Dummy Code 1)	.07	.05	.09	.168	-.12	.05	-.19	.015[†]
	Experimental Condition[b] (Dummy Code 2)	.47	.08	.41	.000*	.35	.11	.29	.003*
	Experimental Condition[c] (Dummy Code 3)	.12	.08	.12	.111	N/A	N/A	N/A	N/A
	Analysis 3 – Schwartz Cultural Values								
Step 1	Schwartz Cultural Values Predictors I→I: $R^2 = .10$ T→T: $R^2 = .11$								
	Achievement	.21	.09	.20	.028	.28	.18	.16	.127
	Benevolence	.05	.11	.04	.634	-.05	.22	-.02	.836
	Conformity	-.05	.09	-.06	.527	-.07	.16	-.05	.668
	Hedonism	-.03	.06	-.05	.593	-.05	.12	-.05	.643
	Power	-.11	.07	-.19	.092	-.22	.13	-.23	.097
	Security	.00	.09	.00	.972	-.07	.17	-.04	.702
	Self-Direction	-.03	.10	-.03	.781	-.03	.20	-.02	.871
	Stimulation	.08	.06	.12	.170	.11	.10	.11	.271
	Tradition	-.03	.09	-.04	.720	-.10	.17	-.06	.535
	Universalism	-.09	.13	-.08	.507	-.08	.24	-.05	.728

(Table 34 continues)

(Table 34 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .17$*								
	T→T: $\Delta R^2 = .11$*								
	Experimental Condition[a] (Dummy Code 1)	.07	.05	.09	.180	-.12	.05	-.18	.019†
	Experimental Condition[b] (Dummy Code 2)	.48	.08	.43	.000*	.37	.10	.33	.000*
	Experimental Condition[c] (Dummy Code 3)	.14	.08	.13	.076	N/A	N/A	N/A	N/A

Note. I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .01$.

[a]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c]Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 35. *Multiple Regression Results for Values and Experimental Condition Predicting Decision Making at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – I/C and PD								
Step 1	I/C and PD Variables I→I: $R^2 = .03$ T→T: $R^2 = .04$								
	Individualism/ Collectivism	-.35	.24	-.11	.141	-.67	.33	-.17	.044
	Power Distance	-.33	.23	-.10	.160	-.31	.32	-.08	.348
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .09$* T→T: $\Delta R^2 = .10$*								
	Experimental Condition[a] (Dummy Code 1)	.19	.12	.11	.130	-.17	.08	-.16	.043
	Experimental Condition[b] (Dummy Code 2)	.44	.18	.17	.014†	.53	.15	.28	.001*
	Experimental Condition[c] (Dummy Code 3)	.53	.17	.22	.002*	N/A	N/A	N/A	N/A
	Analysis 2 – FMAQ Work Values								
Step 1	FMAQ Variables I→I: $R^2 = .11$* T→T: $R^2 = .12$*								
	Interpersonal Relationship Quality	-.47	.16	-.23	.003*	-.43	.20	-.18	.035
	Structure	-.39	.17	-.17	.024†	-.65	.24	-.23	.007*
	Task Variety and Challenge	.02	.15	.01	.906	-.05	.21	-.02	.820
	Work Satisfaction	.73	.21	.28	.001*	1.04	.30	.30	.001*

(Table 35 continues)

(Table 35 continued)

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .03$								
	T→T: $\Delta R^2 = .05$								
	Experimental Condition[a] (Dummy Code 1)	.19	.12	.11	.120	-.17	.08	-.16	.041
	Experimental Condition[b] (Dummy Code 2)	.25	.19	.10	.201	.33	.19	.17	.076
	Experimental Condition[c] (Dummy Code 3)	.36	.18	.15	.052	N/A	N/A	N/A	N/A
	Analysis 3 – Schwartz Cultural Values								
Step 1	Schwartz Cultural Values Predictors								
	I→I: $R^2 = .10$								
	T→T: $R^2 = .15^{\dagger}$								
	Achievement	.07	.21	.03	.741	.07	.30	.02	.818
	Benevolence	-.53	.25	-.19	.039	-.67	.36	-.21	.068
	Conformity	.22	.19	.11	.250	.47	.27	.19	.082
	Hedonism	-.12	.14	-.08	.397	.04	.19	.02	.842
	Power	-.22	.15	-.16	.140	-.31	.21	-.20	.152
	Security	-.33	.21	-.13	.125	-.45	.28	-.15	.118
	Self-Direction	.04	.23	.01	.875	.25	.33	.08	.455
	Stimulation	-.07	.12	-.05	.560	-.04	.16	-.02	.803
	Tradition	-.47	.20	-.23	$.022^{\dagger}$	-.69	.28	-.25	$.014^{\dagger}$
	Universalism	-.15	.29	-.06	.594	-.03	.40	-.01	.950

(Table 35 continues)

(Table 35 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .06$*								
	T→T: $\Delta R^2 = .07$*								
	Experimental Condition[a] (Dummy Code 1)	.17	.12	.09	.185	-.17	.08	-.16	.035
	Experimental Condition[b] (Dummy Code 2)	.44	.19	.17	.022[†]	.47	.17	.25	.007*
	Experimental Condition[c] (Dummy Code 3)	.49	.18	.20	.009*	N/A	N/A	N/A	N/A

Note. I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .01$.

[a]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c]Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

[†] Denotes result approaching significance. Refer to text for further discussion.

Table 36. *Multiple Regression Results for Values and Experimental Condition Predicting Feedback at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – I/C and PD								
Step 1	I/C and PD Variables I→I: $R^2 = .00$ T→T: $R^2 = .01$								
	Individualism/ Collectivism	-.02	.10	-.02	.828	.00	.16	.00	.986
	Power Distance	-.08	.10	-.06	.413	-.20	.16	-.11	.208
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .01$ T→T: $\Delta R^2 = .01$								
	Experimental Condition[a] (Dummy Code 1)	-.02	.05	-.03	.703	-.04	.04	-.08	.340
	Experimental Condition[b] (Dummy Code 2)	.10	.08	.09	.207	.03	.08	.04	.668
	Experimental Condition[c] (Dummy Code 3)	-.01	.07	-.01	.886	N/A	N/A	N/A	N/A
	Analysis 2 – FMAQ Work Values								
Step 1	FMAQ Variables I→I: $R^2 = .02$ T→T: $R^2 = .03$								
	Interpersonal Relationship Quality	.05	.07	.06	.452	.01	.10	.01	.893
	Structure	-.09	.07	-.10	.209	-.20	.12	-.15	.098
	Task Variety and Challenge	.08	.07	.09	.227	.10	.11	.08	.335
	Work Satisfaction	.00	.09	.00	.962	.12	.15	.07	.420

(Table 36 continues)

(Table 36 continued)

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .01$ T→T: $\Delta R^2 = .01$								
	Experimental Condition[a] (Dummy Code 1)	-.02	.05	-.02	.775	-.04	.04	-.08	.320
	Experimental Condition[b] (Dummy Code 2)	.10	.08	.10	.226	-.05	.10	-.06	.587
	Experimental Condition[c] (Dummy Code 3)	-.02	.08	-.02	.831	N/A	N/A	N/A	N/A
	Analysis 3 – Schwartz Cultural Values								
Step 1	Schwartz Cultural Values Predictors I→I: $R^2 = .09$ T→T: $R^2 = .12$								
	Achievement	-.01	.09	-.01	.953	.01	.15	.00	.972
	Benevolence	-.01	.11	-.01	.896	-.05	.18	-.03	.782
	Conformity	-.15	.08	-.17	.063	-.24	.13	-.19	.075
	Hedonism	-.04	.06	-.06	.515	-.08	.10	-.09	.417
	Power	-.14	.06	-.26	.023†	-.22	.10	-.28	.042
	Security	-.09	.09	-.09	.290	-.22	.14	-.15	.112
	Self-Direction	-.25	.09	-.26	.008*	-.44	.16	-.28	.008
	Stimulation	-.04	.05	-.07	.406	-.10	.08	-.13	.203
	Tradition	-.22	.08	-.26	.010*	-.38	.14	-.28	.007*
	Universalism	-.08	.12	-.08	.494	-.13	.20	-.09	.517

(Table 36 continues)

(Table 36 continued)

	Measure	I→I B	SEB	β	p	T→T B	SEB	β	p
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .01$								
	T→T: $\Delta R^2 = .01$								
	Experimental Condition[a] (Dummy Code 1)	-.01	.05	-.01	.879	-.04	.04	-.09	.286
	Experimental Condition[b] (Dummy Code 2)	.07	.08	.07	.371	.00	.09	.00	.967
	Experimental Condition[c] (Dummy Code 3)	-.04	.08	-.04	.622	N/A	N/A	N/A	N/A

Note. I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .01$.

[a]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c]Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 37. *Multiple Regression Results for Values and Experimental Condition Predicting Monitoring at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – I/C and PD								
Step 1	I/C and PD Variables I→I: $R^2 = .02$ T→T: $R^2 = .06$*								
	Individualism/ Collectivism	.29	.33	.06	.383	.15	.42	.03	.714
	Power Distance	-.66	.32	-.15	.044	-1.23	.41	-.24	.003*
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .03$ T→T: $\Delta R^2 = .00$								
	Experimental Condition[a] (Dummy Code 1)	-.23	.18	-.10	.184	.03	.11	.02	.773
	Experimental Condition[b] (Dummy Code 2)	.07	.26	.02	.782	.06	.20	.03	.755
	Experimental Condition[c] (Dummy Code 3)	.42	.24	.13	.080	N/A	N/A	N/A	N/A
	Analysis 2 – FMAQ Work Values								
Step 1	FMAQ Variables I→I: $R^2 = .04$ T→T: $R^2 = .03$								
	Interpersonal Relationship Quality	-.24	.23	-.08	.302	-.06	.28	-.02	.826
	Structure	-.02	.25	-.01	.949	-.37	.32	-.10	.251
	Task Variety and Challenge	.21	.22	.07	.331	.39	.28	.12	.167
	Work Satisfaction	.65	.30	.18	.030	-.25	.40	-.06	.533

(Table 37 continues)

(Table 37 continued)

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .02$ T→T: $\Delta R^2 = .00$								
	Experimental Condition[a] (Dummy Code 1)	-.28	.18	-.11	.120	.03	.11	.02	.768
	Experimental Condition[b] (Dummy Code 2)	-.23	.28	-.07	.399	-.03	.26	-.01	.892
	Experimental Condition[c] (Dummy Code 3)	.10	.27	.03	.696	N/A	N/A	N/A	N/A
	Analysis 3 – Schwartz Cultural Values								
Step 1	Schwartz Cultural Values Predictors I→I: $R^2 = .08$ T→T: $R^2 = .06$								
	Achievement	.29	.30	.09	.332	.30	.40	.08	.457
	Benevolence	-.48	.36	-.12	.184	.14	.49	.04	.770
	Conformity	.11	.27	.04	.695	-.18	.36	-.06	.615
	Hedonism	.07	.19	.03	.713	.36	.26	.15	.175
	Power	-.13	.21	-.07	.543	-.15	.29	-.08	.597
	Security	-.33	.30	-.10	.273	-.15	.38	-.04	.688
	Self-Direction	-.04	.32	-.01	.898	-.32	.45	-.08	.479
	Stimulation	-.04	.17	-.02	.825	-.01	.22	-.01	.966
	Tradition	-.49	.29	-.17	.089	-.36	.37	-.10	.332
	Universalism	.14	.40	.04	.728	.21	.55	.06	.696

(Table 37 continues)

(Table 37 continued)

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .02$ T→T: $\Delta R^2 = .00$								
	Experimental Condition[a] (Dummy Code 1)	-.25	.18	-.10	.167	.03	.12	.02	.799
	Experimental Condition[b] (Dummy Code 2)	-.04	.28	-.01	.892	-.03	.24	-.01	.886
	Experimental Condition[c] (Dummy Code 3)	.34	.27	.10	.198	N/A	N/A	N/A	N/A

Note. I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .01$.

[a]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c]Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 38. *Multiple Regression Results for Values and Experimental Condition Predicting Situational Awareness at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – I/C and PD								
Step 1	I/C and PD Variables I→I: $R^2 = .04^{\dagger}$ T→T: $R^2 = .03$								
	Individualism/ Collectivism	.03	.65	.00	.963	-.79	.99	-.07	.426
	Power Distance	-1.70	.63	-.20	.008*	-1.60	.98	-.14	.103
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .18^{*}$ T→T: $\Delta R^2 = .12^{*}$								
	Experimental Condition[a] (Dummy Code 1)	.14	.31	.03	.666	-.12	.25	-.04	.615
	Experimental Condition[b] (Dummy Code 2)	1.06	.46	.15	.023†	2.04	.45	.36	.000*
	Experimental Condition[c] (Dummy Code 3)	2.65	.43	.40	.000*	N/A	N/A	N/A	N/A
	Analysis 2 – FMAQ Work Values								
Step 1	FMAQ Variables I→I: $R^2 = .13^{*}$ T→T: $R^2 = .12^{*}$								
	Interpersonal Relationship Quality	-.99	.43	-.17	.022†	-1.47	.61	-.20	.018†
	Structure	-1.44	.46	-.23	.002*	-1.76	.71	-.21	.014†
	Task Variety and Challenge	.42	.41	.07	.304	.33	.63	.04	.595
	Work Satisfaction	2.19	.56	.30	.000*	2.90	.89	.28	.001*

(Table 38 continues)

(Table 38 continued)

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .08*$ T→T: $\Delta R^2 = .04$								
	Experimental Condition[a] (Dummy Code 1)	.12	.32	.03	.697	-.12	.25	-.04	.625
	Experimental Condition[b] (Dummy Code 2)	.50	.50	.07	.322	1.42	.56	.25	.012†
	Experimental Condition[c] (Dummy Code 3)	2.12	.48	.32	.000*	N/A	N/A	N/A	N/A
	Analysis 3 – Schwartz Cultural Values								
Step 1	Schwartz Cultural Values Predictors I→I: $R^2 = .12*$ T→T: $R^2 = .11$								
	Achievement	-.13	.57	-.02	.820	.24	.91	.03	.792
	Benevolence	-1.55	.69	-.21	.025†	-1.98	1.11	-.21	.077
	Conformity	.50	.52	.09	.338	1.26	.82	.17	.126
	Hedonism	-.43	.37	-.10	.245	-.07	.59	-.01	.912
	Power	-1.29	.40	-.35	.002*	-1.63	.65	-.35	.014†
	Security	.04	.57	.01	.947	.29	.86	.03	.741
	Self-Direction	-.28	.61	-.04	.649	-.59	1.01	-.06	.560
	Stimulation	.01	.33	.00	.984	.08	.50	.02	.875
	Tradition	-1.05	.55	-.19	.059	-1.20	.84	-.15	.159
	Universalism	-.75	.78	-.11	.338	-.16	1.23	-.02	.895

(Table 38 continues)

(Table 38 continued)

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *P*
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .10^*$ T→T: $\Delta R^2 = .05^\dagger$								
	Experimental Condition[a] (Dummy Code 1)	.02	.33	.00	.954	-.09	.25	-.03	.714
	Experimental Condition[b] (Dummy Code 2)	.63	.50	.09	.214	1.49	.53	.26	.006*
	Experimental Condition[c] (Dummy Code 3)	2.22	.49	.34	.000*	N/A	N/A	N/A	N/A

Note. I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .01$.

[a]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c]Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 39. *Multiple Regression Results for Values and Experimental Condition Predicting Team Leadership at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – I/C and PD								
Step 1	I/C and PD Variables I→I: $R^2 = .03$ T→T: $R^2 = .01$								
	Individualism/ Collectivism	.81	.70	.08	.250	.35	.89	.03	.699
	Power Distance	-1.47	.68	-.16	.033	-.97	.88	-.09	.274
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .11$* T→T: $\Delta R^2 = .00$								
	Experimental Condition[a] (Dummy Code 1)	-.01	.35	.00	.985	.04	.24	.01	.865
	Experimental Condition[b] (Dummy Code 2)	-.85	.52	-.11	.103	.03	.43	.01	.946
	Experimental Condition[c] (Dummy Code 3)	2.24	.48	.32	.000*	N/A	N/A	N/A	N/A
	Analysis 2 – FMAQ Work Values								
Step 1	FMAQ Variables I→I: $R^2 = .03$ T→T: $R^2 = .01$								
	Interpersonal Relationship Quality	-.64	.48	-.11	.185	-.10	.58	-.01	.866
	Structure	.01	.52	.00	.988	-.07	.67	-.01	.915
	Task Variety and Challenge	.09	.46	.01	.848	-.42	.59	-.06	.480
	Work Satisfaction	1.36	.63	.17	.033	.51	.84	.06	.543

(Table 39 continues)

(Table 39 continued)

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .09$* T→T: $\Delta R^2 = .00$								
	Experimental Condition[a] (Dummy Code 1)	-.12	.36	-.02	.743	.07	.24	.03	.766
	Experimental Condition[b] (Dummy Code 2)	-1.37	.57	-.18	.017[†]	-.17	.54	-.03	.747
	Experimental Condition[c] (Dummy Code 3)	1.76	.54	.25	.001*	N/A	N/A	N/A	N/A
	Analysis 3 – Schwartz Cultural Values								
Step 1	Schwartz Cultural Values Predictors I→I: $R^2 = .05$ T→T: $R^2 = .06$								
	Achievement	-.25	.64	-.04	.690	-.22	.84	-.03	.792
	Benevolence	-.88	.76	-.11	.253	.10	1.02	.01	.920
	Conformity	.39	.58	.06	.505	.39	.75	.06	.603
	Hedonism	-.04	.41	-.01	.926	.80	.54	.16	.143
	Power	-.80	.45	-.20	.075	-.19	.60	-.05	.748
	Security	-.54	.64	-.08	.396	-.03	.80	.00	.971
	Self-Direction	.12	.68	.02	.861	-1.19	.93	-.14	.200
	Stimulation	-.19	.37	-.05	.619	.02	.46	.01	.960
	Tradition	-.92	.61	-.15	.135	-.66	.78	-.09	.400
	Universalism	-.28	.86	-.04	.743	.95	1.13	.12	.405

(Table 39 continues)

(Table 39 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I P	T→T B	T→T SEB	T→T β	T→T p
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .09$* T→T: $\Delta R^2 = .00$								
	Experimental Condition[a] (Dummy Code 1)	-.01	.37	.00	.976	.00	.24	.00	.998
	Experimental Condition[b] (Dummy Code 2)	-1.23	.56	-.16	.031	-.01	.50	.00	.987
	Experimental Condition[c] (Dummy Code 3)	1.92	.55	.27	.001*	N/A	N/A	N/A	N/A

Note. I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .01$.

[a]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c]Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 40. *Multiple Regression Results for Values and Experimental Condition Predicting Communication Errors at Individual and Team Levels of Analysis*

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Analysis 1 – I/C and PD								
Step 1	I/C and PD Variables I→I: $R^2 = .00$ T→T: $R^2 = .02$								
	Individualism/ Collectivism	.03	.23	.01	.887	.33	.29	.10	.247
	Power Distance	-.07	.22	-.02	.740	.29	.28	.09	.309
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .12$* T→T: $\Delta R^2 = .12$*								
	Experimental Condition[a] (Dummy Code 1)	.03	.11	.02	.821	.17	.07	.18	.019*
	Experimental Condition[b] (Dummy Code 2)	-.63	.17	-.26	.000*	-.51	.13	-.31	.000*
	Experimental Condition[c] (Dummy Code 3)	-.52	.16	-.23	.001*	N/A	N/A	N/A	N/A
	Analysis 2 – FMAQ Work Values								
Step 1	FMAQ Variables I→I: $R^2 = .07$* T→T: $R^2 = .08$*								
	Interpersonal Relationship Quality	.09	.15	.05	.551	.04	.18	.02	.809
	Structure	.38	.16	.18	.022*	.54	.21	.22	.010*
	Task Variety and Challenge	-.25	.14	-.13	.086	-.12	.18	-.05	.527
	Work Satisfaction	-.42	.20	-.17	.035	-.67	.26	-.23	.012*

(Table 40 continues)

(Table 40 continued)

	Measure	I→I *B*	*SEB*	*β*	*p*	T→T *B*	*SEB*	*β*	*p*
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .08$* T→T: $\Delta R^2 = .08$*								
	Experimental Condition[a] (Dummy Code 1)	.00	.11	.00	.968	.17	.07	.18	.020*
	Experimental Condition[b] (Dummy Code 2)	-.61	.18	-.26	.001*	-.43	.16	-.26	.008*
	Experimental Condition[c] (Dummy Code 3)	-.47	.17	-.21	.006*	N/A	N/A	N/A	N/A
	Analysis 3 – Schwartz Cultural Values								
Step 1	Schwartz Cultural Values Predictors I→I: $R^2 = .06$ T→T: $R^2 = .15$*								
	Achievement	.19	.20	.09	.357	.04	.26	.02	.882
	Benevolence	.06	.24	.02	.800	.39	.31	.14	.217
	Conformity	.11	.18	.06	.544	-.07	.23	-.03	.753
	Hedonism	.09	.13	.07	.471	.05	.17	.03	.762
	Power	.25	.14	.20	.076	.25	.18	.18	.181
	Security	.18	.20	.08	.384	.32	.24	.12	.185
	Self-Direction	.12	.22	.05	.578	-.28	.28	-.10	.323
	Stimulation	-.08	.12	-.06	.479	.01	.14	.01	.941
	Tradition	.20	.19	.11	.304	.60	.24	.25	.012*
	Universalism	.64	.27	.29	.021*	.57	.35	.23	.106

(Table 40 continues)

(Table 40 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .09$* T→T: $\Delta R^2 = .09$*								
	Experimental Condition[a] (Dummy Code 1)	.05	.12	.03	.698	.16	.07	.18	.019*
	Experimental Condition[b] (Dummy Code 2)	-.66	.18	-.28	.000*	-.46	.15	-.28	.002*
	Experimental Condition[c] (Dummy Code 3)	-.48	.17	-.21	.006*	N/A	N/A	N/A	N/A

Note. I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .01$.

[a]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c]Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 41. *Multiple Regression Results for Values and Experimental Condition Predicting Non-Compliance Errors at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – I/C and PD								
Step 1	I/C and PD Variables I→I: $R^2 = .01$ T→T: $R^2 = .03$								
	Individualism/ Collectivism	.19	.24	.06	.442	.45	.30	.13	.133
	Power Distance	.18	.24	.06	.447	.32	.29	.09	.277
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .02$ T→T: $\Delta R^2 = .01$								
	Experimental Condition[a] (Dummy Code 1)	-.12	.13	-.07	.354	.03	.08	.03	.746
	Experimental Condition[b] (Dummy Code 2)	-.24	.19	-.09	.196	-.20	.14	-.12	.167
	Experimental Condition[c] (Dummy Code 3)	-.22	.18	-.09	.206	N/A	N/A	N/A	N/A
	Analysis 2 – FMAQ Work Values								
Step 1	FMAQ Variables I→I: $R^2 = .03$ T→T: $R^2 = .02$								
	Interpersonal Relationship Quality	.07	.17	.04	.655	-.04	.19	-.02	.850
	Structure	.33	.18	.14	.068	.27	.22	.11	.223
	Task Variety and Challenge	-.13	.16	-.06	.410	.14	.20	.06	.486
	Work Satisfaction	-.20	.22	-.08	.353	-.29	.28	-.10	.299

(Table 41 continues)

(Table 41 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .01$								
	T→T: $\Delta R^2 = .01$								
	Experimental Condition[a] (Dummy Code 1)	-.14	.13	-.08	.283	.02	.08	.02	.839
	Experimental Condition[b] (Dummy Code 2)	-.20	.20	-.08	.318	-.24	.18	-.14	.176
	Experimental Condition[c] (Dummy Code 3)	-.18	.19	-.07	.362	N/A	N/A	N/A	N/A
	Analysis 3 – Schwartz Cultural Values								
Step 1	Schwartz Cultural Values Predictors								
	I→I: $R^2 = .03$								
	T→T: $R^2 = .12$								
	Achievement	.09	.22	.04	.674	-.20	.27	-.08	.456
	Benevolence	.28	.26	.10	.285	.21	.33	.07	.522
	Conformity	.12	.20	.06	.558	-.26	.24	-.11	.290
	Hedonism	.06	.14	.04	.670	.00	.18	.00	.990
	Power	.18	.15	.14	.236	.08	.19	.06	.678
	Security	-.08	.22	-.03	.720	-.18	.26	-.06	.496
	Self-Direction	-.22	.24	-.09	.354	-.66	.30	-.23	.028
	Stimulation	.00	.13	.00	.999	.13	.15	.09	.384
	Tradition	.06	.21	.03	.785	.34	.25	.14	.183
	Universalism	.34	.30	.14	.252	.28	.37	.11	.452

(Table 41 continues)

(Table 41 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .02$								
	T→T: $\Delta R^2 = .00$								
	Experimental Condition[a] (Dummy Code 1)	-.11	.13	-.06	.401	.02	.08	.02	.826
	Experimental Condition[b] (Dummy Code 2)	-.24	.20	-.09	.244	-.11	.16	-.06	.504
	Experimental Condition[c] (Dummy Code 3)	-.21	.20	-.09	.284	N/A	N/A	N/A	N/A

Note. I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .01$.

[a]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c]Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 42. *Multiple Regression Results for Values and Experimental Condition Predicting Operational Decision Errors at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – I/C and PD								
Step 1	I/C and PD Variables I→I: $R^2 = .02$ T→T: $R^2 = .01$								
	Individualism/ Collectivism	.19	.12	.12	.108	.20	.18	.09	.273
	Power Distance	-.14	.11	-.09	.224	.05	.17	.02	.796
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .03$ T→T: $\Delta R^2 = .01$								
	Experimental Condition[a] (Dummy Code 1)	.02	.06	.03	.724	-.01	.05	-.02	.827
	Experimental Condition[b] (Dummy Code 2)	-.22	.09	-.18	.015*	-.11	.09	-.11	.210
	Experimental Condition[c] (Dummy Code 3)	.04	.08	.03	.666	N/A	N/A	N/A	N/A
	Analysis 2 – FMAQ Work Values								
Step 1	FMAQ Variables I→I: $R^2 = .07$* T→T: $R^2 = .03$								
	Interpersonal Relationship Quality	-.12	.08	-.12	.120	-.14	.11	-.11	.210
	Structure	.08	.08	.07	.333	.17	.13	.12	.188
	Task Variety and Challenge	.17	.07	.17	.024*	.11	.12	.08	.353
	Work Satisfaction	-.24	.10	-.19	.020*	-.21	.17	-.12	.202

(Table 42 continues)

(Table 42 continued)

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .04$ T→T: $\Delta R^2 = .01$								
	Experimental Condition[a] (Dummy Code 1)	.04	.06	.05	.507	-.02	.05	-.03	.728
	Experimental Condition[b] (Dummy Code 2)	-.24	.09	-.20	.010*	-.14	.11	-.14	.171
	Experimental Condition[c] (Dummy Code 3)	.01	.09	.00	.952	N/A	N/A	N/A	N/A
	Analysis 3 – Schwartz Cultural Values								
Step 1	Schwartz Cultural Values Predictors I→I: $R^2 = .06$ T→T: $R^2 = .09$								
	Achievement	.07	.10	.06	.493	.03	.16	.02	.855
	Benevolence	.00	.12	.00	.979	-.01	.20	-.01	.943
	Conformity	-.14	.09	-.14	.147	-.30	.15	-.23	.041
	Hedonism	-.01	.07	-.02	.836	-.09	.11	-.09	.399
	Power	-.08	.07	-.13	.245	-.12	.12	-.14	.305
	Security	.02	.10	.02	.858	.00	.15	.00	.978
	Self-Direction	-.22	.11	-.19	.053	-.45	.18	-.26	.014*
	Stimulation	.03	.06	.04	.647	.01	.09	.01	.903
	Tradition	-.05	.10	-.05	.615	.01	.15	.01	.943
	Universalism	.09	.14	.08	.507	.03	.22	.02	.897

(Table 42 continues)

(Table 42 continued)

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
Step 2	Experimental Condition Variables I→I: ΔR^2 = .05* T→T: ΔR^2 = .01								
	Experimental Condition[a] (Dummy Code 1)	.03	.06	.04	.571	-.01	.05	-.02	.797
	Experimental Condition[b] (Dummy Code 2)	-.30	.09	-.24	.002*	-.13	.10	-.13	.168
	Experimental Condition[c] (Dummy Code 3)	-.02	.09	-.01	.857	N/A	N/A	N/A	N/A

Note. I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .01$.

[a]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c]Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 43. *Multiple Regression Results for Values and Experimental Condition Predicting Proficiency Errors at Individual and Team Levels of Analysis*

	Measure	I→I *B*	*SEB*	*β*	*p*	T→T *B*	*SEB*	*β*	*p*
	Analysis 1 – I/C and PD								
Step 1	I/C and PD Variables I→I: $R^2 = .01$ T→T: $R^2 = .00$								
	Individualism/ Collectivism	.57	.40	.11	.159	.02	.53	.00	.964
	Power Distance	-.20	.39	-.04	.608	.30	.52	.05	.567
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .01$ T→T: $\Delta R^2 = .01$								
	Experimental Condition[a] (Dummy Code 1)	.18	.21	.06	.396	-.12	.14	-.07	.405
	Experimental Condition[b] (Dummy Code 2)	-.25	.31	-.06	.432	-.24	.26	-.08	.348
	Experimental Condition[c] (Dummy Code 3)	-.29	.29	-.07	.328	N/A	N/A	N/A	N/A
	Analysis 2 – FMAQ Work Values								
Step 1	FMAQ Variables I→I: $R^2 = .01$ T→T: $R^2 = .01$								
	Interpersonal Relationship Quality	-.06	.28	-.02	.829	-.17	.34	-.04	.629
	Structure	-.13	.30	-.03	.666	.20	.40	.04	.620
	Task Variety and Challenge	.29	.27	.08	.276	-.07	.35	-.02	.842
	Work Satisfaction	-.23	.36	-.05	.527	.27	.50	.05	.586

(Table 43 continues)

(Table 43 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .02$ T→T: $\Delta R^2 = .02$								
	Experimental Condition[a] (Dummy Code 1)	.23	.21	.08	.287	-.12	.14	-.07	.395
	Experimental Condition[b] (Dummy Code 2)	-.41	.34	-.10	.231	-.48	.32	-.16	.133
	Experimental Condition[c] (Dummy Code 3)	-.49	.32	-.12	.133	N/A	N/A	N/A	N/A
	Analysis 3 – Schwartz Cultural Values								
Step 1	Schwartz Cultural Values Predictors I→I: $R^2 = .09$ T→T: $R^2 = .10$								
	Achievement	-.09	.35	-.02	.796	.15	.48	.03	.752
	Benevolence	.12	.42	.03	.780	.26	.59	.05	.659
	Conformity	-.51	.32	-.15	.112	-.37	.44	-.09	.393
	Hedonism	.16	.23	.06	.471	.09	.31	.03	.768
	Power	-.26	.25	-.11	.304	-.07	.35	-.03	.831
	Security	-.02	.35	.00	.966	-.04	.46	-.01	.924
	Self-Direction	-.74	.38	-.19	.052	-.91	.53	-.18	.092
	Stimulation	-.19	.21	-.08	.369	-.30	.27	-.11	.268
	Tradition	.18	.34	.05	.589	.05	.45	.01	.909
	Universalism	.45	.48	.11	.348	.84	.65	.19	.199

(Table 43 continues)

(Table 43 continued)

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .01$								
	T→T: $\Delta R^2 = .01$								
	Experimental Condition[a] (Dummy Code 1)	.25	.21	.09	.241	-.16	.14	-.09	.256
	Experimental Condition[b] (Dummy Code 2)	-.28	.33	-.07	.397	.00	.29	.00	.992
	Experimental Condition[c] (Dummy Code 3)	-.16	.32	-.04	.608	N/A	N/A	N/A	N/A

Note. I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .01$.

[a]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b]Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c]Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Personality

Personality measures included the Revised NEO Personality Inventory-Revised (NEO-PI-R; Costa & McRae, 1992) and the Chinese Personality Assessment Inventory (CPAI; Cheung, Song, Ahang, & Zhang, 1996; Cheung, Leung, Zhang, Sun, Gan, Song, & Xie, 2001). In step one, each team and error behavior was regressed onto CPAI and NEO dimensions at two different levels of analysis, individual (I → I) and team (T → T). This analysis depicts the influence of these individual differences on each criterion. In step two, we entered dummy coded variables representing experimental condition. This analysis shows the influence of the experimental manipulation after controlling for the influence of personality variables entered in step one. The results of these analyses are organized below according to level of analysis, individual (I → I) and team (T →T).

Individual Level of Analysis. Experimental condition was operationalized as three dummy coded variables representing the following comparisons: D1 compares single culture condition to single culture + mixed culture conditions, D2 compares single culture American condition with single culture Chinese condition (i.e., for participants who completed only one scenario), and D3 compares single culture American + mixed culture conditions with single culture Chinese + mixed culture conditions (i.e., for participants who completed two scenarios). Correlations for all variables used in analysis are presented in Table 44.

Assertiveness

In step one of Analysis 1, CPAI explained eleven percent of the variance in assertiveness (R^2 = .11, $p \leq$ .011; See Table 46), exceeding the Bonferroni adjusted level of significance. The beta weight for renqing was significant (β = -.25, p = .005). Individuals who place less importance on social reciprocity were more assertive. In step two of Analysis 1, experimental condition explained additional variance in assertiveness (ΔR^2 = .06, $p \leq$ .011). Dummy code 1 was significant (β = .25, p = .001). Participants in single culture teams were more assertive than participants in the combination single culture and mixed culture teams. The final equation was significant, $F(12, 179)$ = 3.08, p = .001.

In step one of Analysis 2, NEO variables did not explain significant variance in assertiveness (R^2 = .03, *n.s.*). In step two of Analysis 2, experimental condition explained seven percent of variance in assertiveness (ΔR^2 = .07, $p \leq$ .011). Dummy code 1 was a significant predictor (β = .22, p = .003). Participants in single culture teams were more assertive than participants in the combination single culture and mixed culture teams. The final equation approached the Bonferroni adjusted level of significance, $F(8, 183)$ = 2.31, p = .022.

Backup

In step one of Analysis 1, CPAI did not explain a significant portion of variance in backup (R^2 = .05, *n.s.*; See Table 47). In step two, experimental condition explained significantly more variance ($\Delta R^2 = .08, p \leq .011$). Dummy code 2 was a significant predictor ($\beta = -.31, p = .000$). Participants in single culture Chinese teams demonstrated more backup than participants in single culture American teams. The overall equation was significant, $F(12, 179) = 2.29, p = .010$.

Step one of Analysis 2 shows that NEO variables did not explain a significant portion of variance in backup (R^2 = .06, *n.s.*). In step two, experimental condition explained unique variance in backup ($\Delta R^2 = .05, p = .019$), approaching the Bonferroni adjusted level of significance. The beta weight for dummy code 2 was significant ($\beta = -.21, p = .003$). Participants in single culture Chinese teams demonstrated more backup than participants in single culture American teams. The final equation was significant, $F(8, 183) = 2.91, p = .004$.

Communication

Step one of Analysis 1 shows that CPAI did not explain significant variance in communication (R^2 = .07, *n.s.*; See Table 48). In step two, experimental condition explained significantly more variance in communication ($\Delta R^2 = .13, p \leq .011$). The regression weight for dummy code 1 was significant ($\beta = .35, p = .000$). Participants in single culture teams communicated more than participants in the combination single culture and mixed culture teams. The final equation was significant, $F(12, 179) = 3.79, p = .000$.

In step one of Analysis 2, NEO did not explain significant variance in communication (R^2 = .03, *n.s.*). Step two of Analysis 2 shows that experimental condition explained significantly more variance in communication ($\Delta R^2 = .15, p \leq .011$). Dummy code 1 was significant ($\beta = .35, p = .000$). Participants in single culture teams communicated more than participants in the combination single culture and mixed culture teams. The regression weight for dummy code 2 nearly reached the Bonferroni adjusted level of significance ($\beta = .17, p = .017$). Participants in single culture American teams communicated more than participants in single culture Chinese teams. The overall equation was significant, $F(8, 183) = 5.16, p = .000$.

Coordination

In step one of Analysis 1, CPAI explained a significant portion of variance in coordination ($R^2 = .11, p \leq .011$; See Table 49). Internal versus external locus of control was a significant predictor ($\beta = -.22, p = .007$). Participants with an internal locus of control (i.e., believe they are responsible for their own destiny) demonstrated better coordination. In step two of Analysis 1, experimental condition explained an additional fourteen percent of variance in coordination ($\Delta R^2 = .14, p \leq .011$). Dummy code 2 significant ($\beta = .40, p = .000$). Participants in single culture American teams were better coordinated than participants in single culture Chinese teams. The final equation was significant, $F(12, 179) = 4.90, p = .000$.

In step one of Analysis 2, NEO facets did not explain significant variance in coordination (R^2 = .04, *n.s.*). In step two, experimental condition explained significantly

more variance in coordination ($\Delta R^2 = .21, p \leq .011$). Dummy code 2 was a significant predictor ($\beta = .45, p = .000$). Participants in the single culture American teams were better coordinated than participants in single culture Chinese teams. The final equation was significant, $F(8, 183) = 7.59, p = .000$.

Decision Making

Step one of Analysis 1 shows that CPAI explained significant variance in decision making ($R^2 = .14, p \leq .011$; See Table 50). The beta weight for harmony approached the Bonferroni adjusted level of significance ($\beta = -.20, p = .023$). Participants who place less emphasis on personal contentment and interpersonal harmony made more decisions. In step two of Analysis 1, experimental condition did not explain unique variance in decision making ($\Delta R^2 = .02$, *n.s.*). The overall equation was significant, $F(12, 179) = 2.86, p = .001$.

In step one of Analysis 2, NEO did not explain a significant portion of variance in decision making ($R^2 = .02$, *n.s.*). In step two of Analysis 2, experimental condition explained unique variance in decision making ($\Delta R^2 = .09, p \leq .011$). Dummy code 2 ($\beta = .19, p = .008$) and dummy code 3 ($\beta = .24, p = .001$) were significant predictors. Participants in single culture American teams made more decisions than participants in single culture Chinese teams. Also, participants in the combination single culture American and mixed culture teams made more decisions than participants in the combination single culture Chinese and mixed culture teams. The final equation was significant, $F(8, 183) = 2.83, p = .006$.

Feedback

In Analysis 1, neither CPAI ($R^2 = .08$, *n.s.*; See Table 51) nor experimental condition ($\Delta R^2 = .02$, *n.s.*) explained significant variance in feedback. The final equation was not significant, $F(12, 179) = 1.65, p = .081$.

In Analysis 2, neither NEO ($R^2 = .03$, *n.s.*) nor experimental condition ($\Delta R^2 = .01$, *n.s.*) explained significant variance in feedback. The overall equation was not significant, $F(8, 183) = .98, p = .452$.

Monitoring

Analysis 1 shows that neither CPAI ($R^2 = .04$, *n.s.*; See Table 52) nor experimental condition ($\Delta R^2 = .01$, *n.s.*) explained significant variance in monitoring. The final equation was not significant, $F(12, 179) = .84, p = .613$.

Analysis 2 shows that neither NEO ($R^2 = .03$, *n.s.*) nor experimental condition ($\Delta R^2 = .02$, *n.s.*) explained a significant portion of variance in monitoring. The final equation was not significant, $F(8, 183) = 1.12, p = .350$.

Situational Awareness

In step one of Analysis 1, CPAI explained 18 percent of variance in situational awareness ($R^2 = .18, p \leq .011$; See Table 53). The beta weight for the internal versus external locus of control facet nearly reached the Bonferroni adjusted level of significance ($\beta = -.20, p = .012$). Participants with an internal locus of control (i.e., believe they control their

destiny) demonstrated more situational awareness. The introduction of experimental condition in step two explained unique variance in situational awareness ($\Delta R^2 = .05, p = .012$), nearly reaching the Bonferroni adjusted level of significance. Dummy code 3 was a significant predictor ($\beta = .25, p = .001$). Participants in the combination single culture American and mixed culture teams demonstrated more situational awareness than participants in the combination single culture Chinese and mixed culture teams. The overall equation was significant, $F(12, 179) = 4.47, p = .000$.

In step one of Analysis 2, NEO did not explain a significant portion of variance in situational awareness ($R^2 = .05$, *n.s.*). Introduction of experimental condition in step two explained thirteen percent of variance situational awareness ($\Delta R^2 = .13, p \leq .011$). The beta weight for dummy code 3 was significant ($\beta = .36, p = .000$). Participants in the combination single culture American and mixed culture teams displayed more situational awareness than participants in the combination single culture Chinese and mixed culture teams. The final equation was significant, $F(8, 183) = 5.07, p = .000$.

Team Leadership

In step one of Analysis 1, CPAI did not explain significant variance in team leadership ($R^2 = .05$, *n.s.*; See Table 54). In step two, experimental condition explained significantly more variance ($\Delta R^2 = .08, p \leq .011$.). The regression weight for dummy code 3 was significant ($\beta = .25, p = .002$). Participants in the combination single culture American and mixed culture teams displayed more team leadership than participants in the combination single culture Chinese and mixed culture teams. The final equation was significant, $F(12, 179) = 2.37, p = .008$.

Step one of Analysis 2 shows that NEO did not explain a significant portion of variance in team leadership ($R^2 = .03$, *n.s.*). In step two, experimental condition explained unique variance in team leadership ($\Delta R^2 = .09, p \leq .011$). Dummy code 3 ($\beta = .28, p = .000$) was a significant predictor. Participants in the combination single culture American and mixed culture teams displayed more team leadership than participants in the combination single culture Chinese and mixed culture teams. The final equation was significant, $F(8, 183) = 3.20, p = .002$.

Communication Errors

In step one of Analysis 1, CPAI explained significant variance in communication errors ($R^2 = .11, p \leq .025$; See Table 55). The beta weight for harmony was significant ($\beta = .24, p = .007$). Participants who are concerned with maintaining harmonious interpersonal relationships made more communication errors. In step two of Analysis 1, experimental condition explained additional variance in communication errors ($\Delta R^2 = .05, p \leq .025$). Dummy code 2 was a significant predictor ($\beta = -.23, p = .004$). Participants in single culture Chinese teams made more communication errors than participants in single culture American teams. The overall equation was significant, $F(12, 179) = 2.91, p = .001$.

In step one of Analysis 2, NEO variables did not explain a significant portion of variance in communication errors ($R^2 = .03$, *n.s.*; See Table 56). In step two, experimental condition explained significantly more variance in communication errors ($\Delta R^2 = .10, p \leq$

.025). Dummy code 2 (β = -.26, p = .000) and dummy code 3 (β = -.21, p = .005) were significant. Participants in single culture Chinese teams made more communication errors than participants in single culture American teams. Also, participants in the combination single culture Chinese and mixed culture teams made more communication errors than participants in the combination single culture American and mixed culture teams. The final equation was significant, $F(8, 183) = 3.29$, $p = .002$.

Non-Compliance Errors

In Analysis 1, neither CPAI (R^2 = .05, *n.s.*; See Table 56) nor experimental condition (ΔR^2 = .01, *n.s.*) explained significant variance in non-compliance errors. The overall equation was not significant, $F(12, 179) = .96$, $p = .486$.

In step one of Analysis 2, neither NEO (R^2 = .02, *n.s.*) nor experimental condition explained significant variance in non-compliance errors (ΔR^2 = .02, *n.s.*). The final equation was not significant, $F(8, 183) = 1.05$, $p = .402$.

Operational Decision Errors

Analysis 1 shows that neither CPAI (R^2 = .02, *n.s.*; See Table 57) nor experimental condition (ΔR^2 = .03, *n.s.*) explained a significant portion of variance in operational decision errors. The beta weight for dummy code 2 in step two was significant (β = -.19, p = .022). Participants in single culture Chinese teams made more operational decision errors than participants in single culture American teams. The final equation was not significant, $F(12, 179) = .85$, $p = .601$.

In Analysis 2, neither NEO (R^2 = .01, *n.s.*) nor experimental condition (ΔR^2 = .04, *n.s.*) explained significant variance in operational decision errors. The beta weight for dummy code 2 was significant in step two (β = -.21, p = .006). Participants in single culture Chinese teams made more operational decision errors than participants in single culture American teams. The final equation was not significant, $F(8, 183) = 1.23$, $p = .284$.

Proficiency Errors.

In Analysis 1, neither CPAI (R^2 = .05, *n.s.*; See Table 58) nor experimental condition (ΔR^2 = .01, *n.s*) explained significant variance in proficiency errors. The final equation was not significant, $F(12, 179) = .86$, $p = .594$.

In Analysis 2, neither NEO (R^2 = .03, *n.s.*) nor experimental condition (ΔR^2 = .02, *n.s.*) explained a significant portion of variance in proficiency errors. The overall equation was not significant, $F(8, 183) = .98$, $p = .454$.

Team Level of Analysis. For the team level of analysis, we aggregated pilot and copilot scores for each variable using the mean. There were 149 teams in our sample, so the total N for the following set of analyses is 149. For each team and error behavior, we entered the CPAI and NEO variables in step one. This analysis shows the influence of these individual differences on each criterion. In step two, we entered two dummy coded variables representing the experimental condition: D1 compares mixed culture teams to the average of single culture American and single culture Chinese teams, and D2 compares single culture

American teams to single culture Chinese teams. This analysis depicts the influence of the experimental manipulation after controlling for the influence of variables entered in step one. Correlations for all variables used in analysis are presented in Table 45.

Assertiveness

In step one of Analysis 1, CPAI explained seventeen percent of variance in assertiveness ($R^2 = .17, p \leq .011$; See Table 46). The regression weight for renqing was significant ($\beta = -.38$, $p = .000$). Teams that place less importance on social reciprocity were more assertive. In step two of Analysis 1, experimental condition did not explain additional significant variance in assertiveness ($\Delta R^2 = .03$, *n.s.*). The final equation was significant, $F(11, 137) = 2.93, p = .002$.

In step one of Analysis 2, NEO variables did not explain a significant portion of variance in assertiveness ($R^2 = .04$, *n.s.*). In step two, experimental condition did not explain unique variance in assertiveness ($\Delta R^2 = .04$, *n.s.*). The final equation was not significant, $F(7, 141) = 1.63, p = .133$.

Backup

In step one of Analysis 1, CPAI did not explain a significant portion of variance in backup ($R^2 = .10$, *n.s.*; See Table 47). The beta weight for modernization approached the Bonferroni adjusted level of significance ($\beta = -.22, p = .021$). Teams that have more traditional attitudes and beliefs demonstrated more backup. In step two of Analysis 1, experimental condition did not explain unique variance in backup ($\Delta R^2 = .04$, *n.s.*). The regression weight for dummy code 2 approached significance ($\beta = -.24, p = .021$). Single culture Chinese teams demonstrated more backup than single culture American teams. The final equation did not reach the Bonferroni adjusted level of significance $F(11, 137) = 2.03, p = .030$.

In Analysis 2, neither NEO ($R^2 = .04$, *n.s.*) nor experimental condition ($\Delta R^2 = .04$, *n.s.*) explained a significant portion of variance in backup. The regression weight for dummy code 2 approached the Bonferroni adjusted level of significance ($\beta = -.21, p = .018$). Single culture Chinese teams demonstrated more backup than single culture American teams. The overall equation was not significant, $F(7, 141) = 1.73, p = .108$.

Communication

Step one of Analysis 1 shows that neither CPAI ($R^2 = .07$, *n.s.;* See Table 48) nor experimental condition ($\Delta R^2 = .04$, *n.s.*) explained significant variance in communication. The regression weight for dummy code 1 approached the Bonferroni adjusted level of significance ($\beta = -.19, p = .021$). Single culture teams communicated more than mixed culture teams. The overall equation was not significant, $F(11, 137) = 1.50, p = .139$.

In step one of Analysis 2, NEO did not explain significant variance in communication ($R^2 = .03$, *n.s.*). Experimental variables entered in step two nearly reached the Bonferroni adjusted level of significance ($\Delta R^2 = .06, p = .013$). The beta weight for dummy code 1 approached significance ($\beta = -.20, p = .016$). Single culture teams communicated more than mixed culture teams. The final equation was not significant, $F(7, 141) = 1.84, p = .085$.

Coordination

Step one of Analysis 1 shows that CPAI did not explain a significant portion of variance in coordination (R^2 = .11, *n.s.*; See Table 49). The beta weight for flexibility approached significance (β = .22, p = .023). Teams that are more adaptable to change demonstrated better coordination. In step two of Analysis 1, experimental condition explained significantly more variance in coordination (ΔR^2 = .09, $p \leq .011$). The regression weight for dummy code 1 approached significance (β = -.18, p = .024). Single culture teams were better coordinated than mixed culture teams. Dummy code 2 was a significant predictor of coordination (β = .31, p = .002). Single culture American teams demonstrated better coordination than single culture Chinese teams. The final equation was significant, $F(11, 137) = 3.16, p = .001$.

In step one of Analysis 2, NEO did not explain significant variance in coordination (R^2 = .06, *n.s.*). In step two of Analysis 2, experimental condition explained significantly more variance in coordination (ΔR^2 = .15, $p \leq .011$). The regression weight for dummy code 1 nearly reached the Bonferroni adjusted level of significance (β = -.18, p = .016). Single culture teams were better coordinated than mixed culture teams. Dummy code 2 was a significant predictor of coordination (β = .37, p = .000). Single culture American teams demonstrated better coordination than single culture Chinese teams. The overall equation was significant, $F(7, 141) = 5.43, p = .000$.

Decision Making

In step one of Analysis 1, CPAI (R^2 = .11, *n.s.*; See Table 50) did not explain significant variance in decision making. In step two, experimental condition explained five percent of unique variance in decision making (ΔR^2 = .05, p = .022), approaching the Bonferroni adjusted level of significance. The final equation was significant, $F(11, 137) = 2.35, p = .011$.

Step one of Analysis 2 shows that NEO did not explain a significant portion of variance in decision making (R^2 = .04, *n.s.*). In step two, experimental condition explained eleven percent of unique variance in decision making (ΔR^2 = .11, $p \leq .011$). Dummy code 2 was a significant predictor (β = .33, p = .000). Single culture American teams made more decisions than single culture Chinese teams. The overall equation was significant, $F(7, 141) = 3.55, p = .002$.

Feedback

In Analysis 1, neither CPAI (R^2 = .11, *n.s.*; See Table 51) nor experimental condition (ΔR^2 = .00, *n.s.*) explained a significant portion of variance in feedback. The beta weight for renqing in step one nearly reached the Bonferroni adjusted level of significance (β = .25, p = .019). Teams that emphasize social reciprocity demonstrated more feedback. The final equation was not significant, $F(11, 137) = 1.55, p = .122$.

In Analysis 2, neither NEO (R^2 = .02, *n.s.*) nor experimental condition (ΔR^2 = .01, *n.s.*) explained significant variance in feedback. The overall equation was not significant, $F(7, 141) = .60, p = .754$.

Monitoring

In step one of Analysis 1, CPAI did not explain significant variance in monitoring (R^2 = .11, *n.s.*; See Table 52). Renqing was a significant predictor (β = -.28, p = .008). Teams that place less emphasis on social reciprocity demonstrated more monitoring. The regression weight for family orientation nearly reached the Bonferroni adjusted level of significance (β = .22, p = .015). Teams that emphasize family engaged in more monitoring. In step two, experimental condition did not explain unique variance in monitoring (ΔR^2 = .00, *n.s.*). The overall equation was not significant, $F(11, 137) = 1.52$, p = .130.

Analysis 2 shows that neither NEO (R^2 = .02, *n.s.*) nor experimental condition (ΔR^2 = .00, *n.s.*) explained significant variance in monitoring. The final equation was not significant, $F(7, 141) = .34$, p = .933.

Situational Awareness

In step one of Analysis 1, CPAI explained fifteen percent of variance in situational awareness ($R^2 = .15, p \leq .011$; See Table 53). The beta weight for internal versus external locus of control nearly reached the Bonferroni adjusted level of significance (β = -.23, p = .014). Teams with an internal locus of control demonstrated more situational awareness. Experimental condition entered in the second step of Analysis 1 did not explain unique variance in situational awareness (ΔR^2 = .03, *n.s.*). The regression weight for dummy code two approached significance (β = .23, p = .024). Single culture American teams displayed more situational awareness than single culture Chinese teams. The final equation was significant, $F(11, 137) = 2.79$, p = .003.

In step one of Analysis 2, NEO variables did not explain a significant portion of variance in situational awareness (R^2 = .06, *n.s.*). In step two of Analysis 2, experimental condition explained significantly more variance in situational awareness ($\Delta R^2 = .09, p \leq .011$). Dummy code 2 was significant (β = .33, p = .000). Single culture American teams demonstrated more situational awareness than single culture Chinese teams. The overall equation was significant, $F(7, 141) = 3.52$, p = .002.

Team Leadership

In Analysis 1, neither CPAI (R^2 = .07, *n.s.*; See Table 54) nor experimental condition (ΔR^2 = .00, *n.s.*) explained significant variance in team leadership. The beta weight for family orientation in step one approached the Bonferroni adjusted level of significance (β = .22, p = .021). Teams that emphasize the importance of family demonstrated more team leadership. The final equation was not significant, $F(11, 137) = 1.00$, p = .454.

In Analysis 2, neither NEO (R^2 = .03, *n.s.*) nor experimental condition (ΔR^2 = .00, *n.s.*) explained significant variance in team leadership. The final equation was not significant, $F(7, 141) = .61$, p = .744.

Communication Errors

Step one of Analysis 1 shows that CPAI explained significant variance in team communication errors ($R^2 = .16, p \leq .025$; See Table 55). Harmony (β = .24, p = .017) and

internal versus external locus of control ($\beta = .24, p = .012$) were significant predictors. Teams that value interpersonal harmony made more communication errors. Also, teams with an external locus of control made more communication errors. Experimental condition entered in the second step of Analysis 1 explained unique variance in communication errors ($\Delta R^2 = .04, p \leq .025$). Dummy code 1 ($\beta = .19, p = .017$) was significant. Mixed culture teams made more communication errors than single culture teams. The final equation was significant, $F(11, 137) = 3.15, p = .001$.

In step one of Analysis 2, NEO explained eleven percent of variance in communication errors ($R^2 = .11, p \leq .025$.). Agreeableness ($\beta = .24, p = .009$) and openness to experience ($\beta = -.28, p = .003$) were significant predictors. Teams that are more trusting and cooperative (i.e., more agreeable) and less open to new ideas and experiences made more communication errors. In step two of Analysis 2, experimental condition explained additional variance in communication errors ($\Delta R^2 = .09, p \leq .025$). Beta weights for dummy code 1 ($\beta = .18, p = .018$) and dummy code 2 ($\beta = -.25, p = .003$) were the significant. Mixed culture teams made more communication errors than single culture teams. Also, single culture Chinese teams made more communication errors than single culture American teams. The final equation was significant, $F(7, 141) = 4.79, p = .000$.

Non-Compliance Errors

In Analysis 1, neither CPAI ($R^2 = .08$, *n.s.*; See Table 56) nor experimental condition ($\Delta R^2 = .00$, *n.s.*) explained significant variance in non-compliance errors. The final equation was not significant, $F(11, 137) = 1.15, p = .328$.

Analysis 2 shows that neither NEO ($R^2 = .07$, *n.s.*) nor experimental condition ($\Delta R^2 = .02$, *n.s.*) explained a significant portion of variance in non-compliance errors. Agreeableness was a significant predictor in step one ($\beta = .27, p = .003$). Teams that are more trusting and cooperative made more non-compliance errors. The overall equation was not significant, $F(7, 141) = 1.90, p = .073$.

Operational Decision Errors

In Analysis 1, neither CPAI ($R^2 = .04$, *n.s.*; See Table 57) nor experimental condition ($\Delta R^2 = .00$, *n.s.*) explained significant variance in operational decision errors. The final equation was not significant, $F(11, 137) = .58, p = .841$.

Analysis 2 shows that neither NEO ($R^2 = .02$, *n.s.*) nor experimental condition ($\Delta R^2 = .02$, *n.s.*) explained significant variance in operational decision errors. The final equation was not significant, $F(7, 141) = .75, p = .631$.

Proficiency Errors.

In Analysis 1, neither CPAI ($R^2 = .10$, *n.s.*; See Table 58) nor experimental condition ($\Delta R^2 = .01$, *n.s.*) explained a significant portion of variance in proficiency errors. The overall equation was not significant, $F(11, 137) = 1.41, p = .174$.

In Analysis 2, neither NEO (R^2 = .03, *n.s.*) nor experimental condition (ΔR^2 = .01, *n.s.*) explained significant variance in proficiency errors. The final equation was not significant, $F(7, 141) = .76, p = .622$.

Table 44. *I → I Correlations Between Personality Variables (CPAI and NEO) and Team and Error Behaviors*

Variable	1	2	3	4	5	6	7	8	9	10
1. Experimental Condition Dummy Code 1	--									
2. Experimental Condition Dummy Code 2	.02	--								
3. Experimental Condition Dummy Code 3	-.01	.00	--							
4. Harmony (CPAI)	-.02	-.16*	-.27**	--						
5. Leadership (CPAI)	-.03	.09	.21**	.06	--					
6. Face (CPAI)	.09	-.07	-.20**	.21**	-.10	--				
7. Renqing (CPAI)	.10	-.23**	-.24**	.46**	-.02	.28**	--			
8. Family Orientation (CPAI)	-.07	-.16*	-.17*	.32**	-.01	.00	.33**	--		
9. Flexibility (CPAI)	-.01	.17*	.24**	-.34**	-.13	-.29**	-.19**	-.06	--	
10. Modernization (CPAI)	-.11	.14	.20**	-.29**	-.11	-.28**	-.17*	-.03	.32**	--
11. Adventurousness (CPAI)	-.08	.18*	.37**	-.19**	.38**	-.36**	-.27**	-.03	.33**	.23**
12. Internal/External Locus of Control (CPAI)	.14*	-.32**	-.24**	.05	-.02	.33**	.32**	-.05	-.12	-.26**
13. Neuroticism (NEO)	.03	.01	-.11	-.07	-.28**	.39**	.08	-.16*	-.10	-.05
14. Extraversion (NEO)	-.08	.22**	.21**	-.11	.56**	-.07	-.13	-.01	.14	.01
15. Openness (NEO)	-.06	.08	.27**	-.09	.20**	-.21**	-.05	-.05	.42**	.26**
16. Agreeableness (NEO)	-.02	.01	.03	.33**	-.13	-.02	.18**	.27**	.08	.03
17. Conscientiousness (NEO)	-.08	-.08	.06	.18*	.29**	-.12	.05	.19**	-.36**	-.03

(Table 44 continues)

Note: N = 196. Team and error behaviors are reported as means for participants who completed two scenarios. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese and mixed culture conditions, -1 = Single culture American and mixed culture conditions, 1= Single culture American condition only, and 1 = Single culture Chinese condition only. Experimental condition dummy code 2 coded as follows: 0 = Single culture American and mixed conditions, 0 = Single culture Chinese and mixed conditions, -1 = Single culture Chinese condition only, and 1 = Single culture American condition only. Experimental condition dummy code 3 coded as follows: 0 = Single culture American condition only, 0 = Single culture Chinese condition only, -1 = Single culture Chinese and mixed culture conditions, and 1 = Single culture American and mixed culture conditions. * $p \leq .05$. ** $p \leq .01$.

(Table 44 Continued)

Variable	11	12	13	14	15	16	17	18	19	20
1. Experimental Condition Dummy Code 1										
2. Experimental Condition Dummy Code 2										
3. Experimental Condition Dummy Code 3										
4. Harmony (CPAI)										
5. Leadership (CPAI)										
6. Face (CPAI)										
7. Renqing (CPAI)										
8. Family Orientation (CPAI)										
9. Flexibility (CPAI)										
10. Modernization (CPAI)										
11. Adventurousness (CPAI)	--									
12. Internal/External Locus of Control (CPAI)	-.32**	--								
13. Neuroticism (NEO)	-.47**	.27**	--							
14. Extraversion (NEO)	.37**	-.13	-.32**	--						
15. Openness (NEO)	.28**	-.18*	-.21**	.31**	--					
16. Agreeableness (NEO)	.01	-.14*	-.31**	.01	.21**	--				
17. Conscientiousness (NEO)	.17*	-.21**	-.48**	.22**	.02	.19**	--			

(Table 44 continues)

Note: N = 196. Team and error behaviors are reported as means for participants who completed two scenarios. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese and mixed culture conditions, -1 = Single culture American and mixed culture conditions, 1= Single culture American condition only, and 1 = Single culture Chinese condition only. Experimental condition dummy code 2 coded as follows: 0 = Single culture American and mixed conditions, 0 = Single culture Chinese and mixed conditions, -1 = Single culture Chinese condition only, and 1 = Single culture American condition only. Experimental condition dummy code 3 coded as follows: 0 = Single culture American condition only, 0 = Single culture Chinese condition only, -1 = Single culture Chinese and mixed culture conditions, and 1 = Single culture American and mixed culture conditions. * $p \leq .05$. ** $p \leq .01$.

(Table 44 Continued)

Variable	1	2	3	4	5	6	7	8	9	10
18. Assertiveness	.22**	.07	.13	-.24**	.01	-.12	-.32**	-.15*	.11	.06
19. Decision Making	.09	.17*	.22**	-.30**	-.02	-.13	-.26**	-.16*	.17*	.11
20. Situational Awareness	.00	.13	.38**	-.28**	.08	-.22**	-.25**	-.17*	.21**	.20**
21. Team Leadership	-.02	-.13	.30**	-.15*	.07	-.15*	-.11	.04	.09	.10
22. Communication	.34**	.17*	.08	-.22**	.00	-.05	-.21**	-.16*	.07	.02
23. Monitoring	-.11	.00	.11	-.09	.07	-.13	-.16*	.01	.05	.05
24. Feedback	-.03	.09	-.01	-.08	-.01	.07	.13	.00	.14	.01
25. Backup	-.08	-.21**	.09	.05	.04	-.06	-.01	.09	.10	.01
26. Coordination	.08	.43**	.15*	-.15*	.01	-.03	-.09	-.10	.18*	.07
27. Non-Compliance Errors	-.06	-.09	-.09	.14*	-.07	.09	.08	.14*	.02	-.06
28. Communication Errors	.02	-.26**	-.23**	.23**	-.08	.08	.06	.10	-.13	-.17*
29. Proficiency Errors	.06	-.07	-.08	.07	-.16*	-.05	.05	.06	-.02	.08
30. Operational Decision Errors	.02	-.19**	.02	.04	-.02	-.05	-.01	.05	-.06	.00

(Table 44 continues)

Note: N = 196. Team and error behaviors are reported as means for participants who completed two scenarios. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese and mixed culture conditions, -1 = Single culture American and mixed culture conditions, 1= Single culture American condition only, and 1 = Single culture Chinese condition only. Experimental condition dummy code 2 coded as follows: 0 = Single culture American and mixed conditions, 0 = Single culture Chinese and mixed conditions, -1 = Single culture Chinese condition only, and 1 = Single culture American condition only. Experimental condition dummy code 3 coded as follows: 0 = Single culture American condition only, 0 = Single culture Chinese condition only, -1 = Single culture Chinese and mixed culture conditions, and 1 = Single culture American and mixed culture conditions. * $p \leq .05$. ** $p \leq .01$.

(Table 44 Continued)

Variable	11	12	13	14	15	16	17	18	19	20
18. Assertiveness	.13	-.08	-.01	.03	.01	-.14*	.01	--		
19. Decision Making	.19**	-.19**	.02	-.02	.01	-.13	-.02	.54**	--	
20. Situational Awareness	.25**	-.27**	.05	.13	.18*	-.03	-.04	.43**	.44**	--
21. Team Leadership	.12	-.10	-.09	.09	.09	-.07	.09	.28**	.22**	.45**
22. Communication	.07	-.05	-.01	.06	-.01	-.15*	.04	.76**	.52**	.21**
23. Monitoring	.08	-.11	-.07	.13	.06	-.06	.10	.33**	.19**	.33**
24. Feedback	.07	.12	.01	.11	.11	.10	.04	.05	.00	.05
25. Backup	.09	-.17*	-.21**	.07	.15*	.12	.17*	.08	.10	.25**
26. Coordination	.17*	-.22**	-.01	.13	.13	.02	.12	.25**	.32**	.27**
27. Non-Compliance Errors	-.05	.08	-.06	.04	-.04	.09	.01	-.12	-.16*	-.03
28. Communication Errors	-.16*	.16*	.05	-.10	-.15*	.00	-.01	-.14	-.17*	-.13
29. Proficiency Errors	-.07	.01	.08	-.07	.06	.05	-.10	-.01	-.03	.20**
30. Operational Decision Errors	-.08	.02	-.01	.01	.08	.07	.05	-.05	-.08	.19**

(Table 44 continues)

Note: N = 196. Team and error behaviors are reported as means for participants who completed two scenarios. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese and mixed culture conditions, -1 = Single culture American and mixed culture conditions, 1= Single culture American condition only, and 1 = Single culture Chinese condition only. Experimental condition dummy code 2 coded as follows: 0 = Single culture American and mixed conditions, 0 = Single culture Chinese and mixed conditions, -1 = Single culture Chinese condition only, and 1 = Single culture American condition only. Experimental condition dummy code 3 coded as follows: 0 = Single culture American condition only, 0 = Single culture Chinese condition only, -1 = Single culture Chinese and mixed culture conditions, and 1 = Single culture American and mixed culture conditions. * $p \leq .05$. ** $p \leq .01$.

(Table 44 Continued)

Variable	21	22	23	24	25	26	27	28	29	30
18. Assertiveness										
19. Decision Making										
20. Situational Awareness										
21. Team Leadership	--									
22. Communication	.11	--								
23. Monitoring	.54**	.14*	--							
24. Feedback	.01	.04	-.03	--						
25. Backup	.41**	.01	.31**	-.08	--					
26. Coordination	.02	.26**	.11	.29**	.05	--				
27. Non-Compliance Errors	.19**	-.20**	.19**	-.02	.02	-.15*	--			
28. Communication Errors	.07	-.18*	.08	-.09	.01	-.35**	.33**	--		
29. Proficiency Errors	-.06	-.07	-.22**	.06	.02	.02	-.06	.00	--	
30. Operational Decision Errors	.19**	-.18*	.02	-.05	.13	-.18**	.16*	.30**	.44**	--

Note: N = 196. Team and error behaviors are reported as means for participants who completed two scenarios. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese and mixed culture conditions, -1 = Single culture American and mixed culture conditions, 1= Single culture American condition only, and 1 = Single culture Chinese condition only. Experimental condition dummy code 2 coded as follows: 0 = Single culture American and mixed conditions, 0 = Single culture Chinese and mixed conditions, -1 = Single culture Chinese condition only, and 1 = Single culture American condition only. Experimental condition dummy code 3 coded as follows: 0 = Single culture American condition only, 0 = Single culture Chinese condition only, -1 = Single culture Chinese and mixed culture conditions, and 1 = Single culture American and mixed culture conditions. * $p \leq .05$. ** $p \leq .01$.

Table 45. *T → T Correlations Between Personality Variables (CPAI and NEO) and Team and Error Behaviors*

Variable	1	2	3	4	5	6	7	8	9
1. Experimental Condition Dummy Code 1	--								
2. Experimental Condition Dummy Code 2	-.01	--							
3. Harmony (CPAI)	.02	-.33**	--						
4. Leadership (CPAI)	.04	.24**	.03	--					
5. Face (CPAI)	-.04	-.21*	.23**	.03	--				
6. Renqing (CPAI)	-.05	-.36**	.51**	-.07	.22**	--			
7. Family Orientation (CPAI)	.05	-.26**	.35**	-.09	-.02	.38**	--		
8. Flexibility (CPAI)	-.01	.36**	-.32**	-.17*	-.34**	-.18*	-.07	--	
9. Modernization (CPAI)	.05	.28**	-.33**	-.09	-.31**	-.19*	-.03	.27**	--
10. Adventurousness (CPAI)	.06	.43**	-.24**	.37**	-.38**	-.32**	-.05	.39**	.28**
11. Internal/External Locus of Control (CPAI)	-.09	-.41**	.07	-.06	.36**	.32**	-.02	-.20*	-.30**
12. Neuroticism (NEO)	-.02	-.09	-.02	-.18*	.34**	.08	-.12	-.16	-.05
13. Extroversion (NEO)	.05	.33**	-.14	.56**	.03	-.11	-.08	.09	.00
14. Openness to Experience (NEO)	.03	.30**	-.04	.20*	-.22**	-.09	-.05	.38**	.21**
15. Agreeableness (NEO)	.01	.03	.30**	-.14	-.01	.27**	.30**	.13	.02
16. Conscientiousness (NEO)	.04	-.01	.09	.26**	-.10	.08	.18*	-.22**	-.02

(Table 45 continues)

Note. N = 149. All personality and team/error behaviors are reported as means of pilot and copilot scores. Experimental condition dummy code 1 coded as follows: -1 = Single culture American teams, -1 = Single culture Chinese teams, and 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, and 1 = Single culture American teams. * $p \leq .05$. ** $p \leq .01$.

(Table 45 Continued)

Variable	10	11	12	13	14	15	16	17	18	19
1. Experimental Condition Dummy Code 1										
2. Experimental Condition Dummy Code 2										
3. Harmony (CPAI)										
4. Leadership (CPAI)										
5. Face (CPAI)										
6. Renqing (CPAI)										
7. Family Orientation (CPAI)										
8. Flexibility (CPAI)										
9. Modernization (CPAI)										
10. Adventurousness (CPAI)	--									
11. Internal/External Locus of Control (CPAI)	-.41**	--								
12. Neuroticism (NEO)	-.50**	.29**	--							
13. Extroversion (NEO)	.35**	-.19*	-.21**	--						
14. Openness to Experience (NEO)	.31**	-.28**	-.28**	.30**	--					
15. Agreeableness (NEO)	.01	-.16	-.32**	.03	.36**	--				
16. Conscientiousness (NEO)	.18*	-.15	-.48**	.22**	.12	.23**	--			

(Table 45 continues)

Note. N = 149. All personality and team/error behaviors are reported as means of pilot and copilot scores. Experimental condition dummy code 1 coded as follows: -1 = Single culture American teams, -1 = Single culture Chinese teams, and 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, and 1 = Single culture American teams. * $p \leq .05$. ** $p \leq .01$.

(Table 45 Continued)

Variable	1	2	3	4	5	6	7	8	9	10
17. Assertiveness	-.14	.14	-.26**	-.04	-.10	-.39**	-.13	.13	.09	.11
18. Decision Making	-.15	.29**	-.26**	-.04	-.11	-.23**	-.12	.17*	.16	.18*
19. Situational Awareness	-.03	.34**	-.21**	-.01	-.17*	-.27**	-.10	.16*	.21**	.16
20. Team Leadership	.02	-.01	-.13	-.08	-.02	-.06	.12	.01	.01	-.04
21. Communication	-.20*	.14	-.21*	-.01	-.04	-.20*	-.15	.11	.00	.05
22. Monitoring	.04	.00	-.14	-.08	-.08	-.23**	.10	.04	.09	.09
23. Feedback	-.07	.03	-.06	-.02	.04	.17*	.04	.18*	.03	.05
24. Backup	-.06	-.16	.12	-.06	.03	.09	.15	.02	-.15	.06
25. Coordination	-.18*	.37**	-.14	.02	-.04	-.10	-.06	.26**	.08	.19*
26. Non-Compliance Errors	.02	-.12	.16	-.09	.09	.18*	.13	-.09	.04	-.10
27. Communication Errors	.18*	-.30**	.26**	-.09	.02	.18*	.12	-.20*	-.12	-.23**
28. Proficiency Errors	-.07	-.07	.10	-.17*	-.10	.02	.15	.04	.06	-.13
29. Operational Decision Errors	-.02	-.11	.03	-.03	.02	.05	.04	-.11	.08	-.11

(Table 45 continues)

Note. N = 149. All personality and team/error behaviors are reported as means of pilot and copilot scores. Experimental condition dummy code 1 coded as follows: -1 = Single culture American teams, -1 = Single culture Chinese teams, and 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, and 1 = Single culture American teams. * $p \leq .05$. ** $p \leq .01$.

(Table 45 Continued)

Variable	11	12	13	14	15	16	17	18	19	20
17. Assertiveness	-.09	.01	-.01	.00	-.17*	-.04	--			
18. Decision Making	-.18*	.02	-.02	.04	-.15	.00	.55**	--		
19. Situational Awareness	-.30**	.10	.12	.15	.01	.00	.42**	.33**	--	
20. Team Leadership	.09	.12	.00	-.06	-.14	-.02	.27**	.17*	.44**	--
21. Communication	-.03	-.01	.06	-.01	-.13	.04	.78**	.51**	.14	.07
22. Monitoring	-.09	-.02	.07	.05	-.05	.06	.29**	.14	.29**	.54**
23. Feedback	.13	.05	.06	.09	.09	.01	.03	.08	.09	.25**
24. Backup	-.13	-.19*	.02	.08	.11	.09	.04	.11	.15	.17*
25. Coordination	-.19*	.00	.11	.17*	.03	.14	.29**	.41**	.40**	.15
26. Non-Compliance Errors	.16	.08	.01	-.04	.17*	-.10	-.17*	-.15	.15	.12
27. Communication Errors	.23**	.12	-.14	-.23**	.09	-.08	-.17*	-.24**	.03	.09
28. Proficiency Errors	-.03	.05	-.09	.00	.10	-.09	.05	.03	.34**	.45**
29. Operational Decision Errors	.08	.03	.03	.02	.10	.04	-.12	-.08	.20*	.34**

(Table 45 continues)

Note. N = 149. All personality and team/error behaviors are reported as means of pilot and copilot scores. Experimental condition dummy code 1 coded as follows: -1 = Single culture American teams, -1 = Single culture Chinese teams, and 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, and 1 = Single culture American teams. * $p \leq .05$. ** $p \leq .01$.

(Table 45 Continued)

Variable	21	22	23	24	25	26	27	28	29
17. Assertiveness									
18. Decision Making									
19. Situational Awareness									
20. Team Leadership									
21. Communication	--								
22. Monitoring	.04	--							
23. Feedback	.07	.12	--						
24. Backup	.03	.17*	.06	--					
25. Coordination	.26**	.17*	.26**	.06	--				
26. Non-Compliance Errors	-.28**	.09	.08	.00	-.10	--			
27. Communication Errors	-.22**	.01	-.09	.01	-.38**	.21*	--		
28. Proficiency Errors	-.13	.31**	.00	.03	.01	.37**	.33**	--	
29. Operational Decision Errors	-.20*	.21*	.00	.04	-.18*	.36**	.43**	.56**	--

Note. N = 149. All personality and team/error behaviors are reported as means of pilot and copilot scores. Experimental condition dummy code 1 coded as follows: -1 = Single culture American teams, -1 = Single culture Chinese teams, and 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, and 1 = Single culture American teams. * $p \leq .05$. ** $p \leq .01$.

Table 46. *Multiple Regression Results for Personality and Experimental Condition Predicting Assertiveness at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – CPAI								
Step 1	I→I: $R^2 = .11$*								
	T→T: $R^2 = .17$*								
	Adventurousness	2.83	4.77	.05	.554	-.52	6.64	-.01	.937
	Face	-.49	3.47	-.01	.888	-.06	4.50	.00	.990
	Family Orientation	-2.20	4.01	-.04	.584	2.80	5.39	.05	.605
	Flexibility	1.93	3.55	.05	.586	2.40	5.31	.04	.652
	Internal vs. External	1.63	4.50	.03	.718	2.39	6.32	.04	.706
	Harmony	-4.22	4.53	-.08	.353	-4.30	6.08	-.07	.480
	Leadership	-.22	3.73	-.01	.954	-2.77	5.12	-.05	.589
	Modernization	-2.09	4.63	-.04	.652	-.30	6.31	.00	.962
	Renqing	-16.33	5.71	-.25	.005*	-29.47	7.78	-.38	.000*
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .06$*								
	T→T: $\Delta R^2 = .03$								
	Experimental Condition[a] (Dummy Code 1)	2.33	.66	.25	.001*	-.89	.44	-.16	.044
	Experimental Condition[b] (Dummy Code 2)	-.33	1.06	-.02	.759	.01	1.01	.00	.993
	Experimental Condition[c] (Dummy Code 3)	.22	1.03	.02	.832	N/A	N/A	N/A	N/A
	Analysis 2 – NEO-PI-R								
Step 1	I→I: $R^2 = .03$								
	T→T: $R^2 = .04$								
	Agreeableness	-.67	.32	-.16	.037	-.94	.42	-.20	.029

(Table 46 continues)

(Table 46 continued)

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Conscientiousness	.00	.26	.00	.999	-.07	.37	-.02	.848
	Extraversion	.03	.26	.01	.903	-.10	.33	-.03	.763
	Neuroticism	-.18	.30	-.05	.542	-.22	.42	-.05	.602
	Openness	.12	.24	.04	.625	.27	.36	.07	.465
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .07$* T→T: $\Delta R^2 = .04$								
	Experimental Condition[a] (Dummy Code 1)	2.05	.67	.22	.003*	-.78	.46	-.14	.091
	Experimental Condition[b] (Dummy Code 2)	1.01	1.01	.07	.320	1.56	.90	.15	.084
	Experimental Condition[c] (Dummy Code 3)	1.65	.96	.13	.086	N/A	N/A	N/A	N/A

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (1), single culture American and mixed (-1), single culture Chinese and mixed (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (-1), single culture American and mixed (0), single culture Chinese and mixed (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American only (0), single culture Chinese only (0), single culture American and mixed (1), single culture Chinese and mixed (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 47. *Multiple Regression Results for Personality and Experimental Condition Predicting Backup at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – CPAI								
Step 1	I→I: $R^2 = .05$								
	T→T: $R^2 = .10$								
	Adventurousness	.29	1.21	.02	.809	2.56	1.91	.15	.181
	Face	.13	.88	.01	.888	1.11	1.29	.08	.393
	Family Orientation	.77	1.02	.06	.449	1.84	1.55	.11	.236
	Flexibility	1.30	.90	.12	.152	.08	1.53	.01	.957
	Internal vs. External	-2.18	1.14	-.16	.057	-3.72	1.82	-.20	.042
	Harmony	.85	1.15	.07	.463	.04	1.74	.00	.983
	Leadership	.52	.95	.05	.583	-2.00	1.47	-.13	.176
	Modernization	-.69	1.17	-.05	.557	-4.23	1.81	-.22	.021[†]
	Renqing	.20	1.45	.01	.891	1.89	2.23	.09	.398
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .08$*								
	T→T: $\Delta R^2 = .04$								
	Experimental Condition[a] (Dummy Code 1)	-.10	.17	-.04	.557	-.12	.13	-.08	.331
	Experimental Condition[b] (Dummy Code 2)	-1.05	.27	-.31	.000*	-.67	.29	-.24	.021[†]
	Experimental Condition[c] (Dummy Code 3)	-.01	.26	.00	.982	N/A	N/A	N/A	N/A
	Analysis 2 – NEO-PI-R								
Step 1	I→I: $R^2 = .06$								
	T→T: $R^2 = .04$								
	Agreeableness	.03	.08	.03	.709	.06	.12	.04	.636

(Table 47 continues)

(Table 47 continued)

	Measure	I→I B	SEB	β	p	T→T B	SEB	β	p
	Conscientiousness	.07	.06	.09	.266	-.01	.10	-.01	.958
	Extraversion	-.03	.06	-.04	.586	-.03	.09	-.03	.766
	Neuroticism	-.12	.07	-.15	.085	-.21	.12	-.17	.082
	Openness	.08	.06	.11	.146	.02	.10	.02	.803
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .05^{\dagger}$ T→T: $\Delta R^2 = .04$								
	Experimental Condition[a] (Dummy Code 1)	-.15	.16	-.06	.370	-.11	.13	-.07	.407
	Experimental Condition[b] (Dummy Code 2)	-.72	.24	-.21	.003*	-.59	.25	-.21	.018†
	Experimental Condition[c] (Dummy Code 3)	.13	.23	.04	.586	N/A	N/A	N/A	N/A

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (1), single culture American and mixed (-1), single culture Chinese and mixed (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (-1), single culture American and mixed (0), single culture Chinese and mixed (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American only (0), single culture Chinese only (0), single culture American and mixed (1), single culture Chinese and mixed (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 48. *Multiple Regression Results for Personality and Experimental Condition Predicting Communication at Individual and Team Levels of Analysis*

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Analysis 1 – CPAI								
Step 1	I→I: $R^2 = .07$								
	T→T: $R^2 = .07$								
	Adventurousness	2.22	7.11	.03	.755	-1.75	10.73	-.02	.871
	Face	1.01	5.17	.02	.845	1.16	7.27	.02	.874
	Family Orientation	-5.35	5.97	-.07	.372	-4.78	8.71	-.05	.584
	Flexibility	-.54	5.28	-.01	.919	6.23	8.59	.07	.470
	Internal vs. External	-1.12	6.70	-.01	.867	-.67	10.22	-.01	.948
	Harmony	-12.94	6.75	-.17	.057	-13.68	9.82	-.15	.166
	Leadership	.06	5.56	.00	.991	-.53	8.28	-.01	.949
	Modernization	-4.69	6.89	-.06	.497	-9.64	10.21	-.09	.347
	Renqing	-9.77	8.50	-.10	.252	-13.30	12.57	-.11	.292
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .13$*								
	T→T: $\Delta R^2 = .04$								
	Experimental Condition[a] (Dummy Code 1)	4.87	.943	.35	.000*	-1.64	.70	-.19	.021[†]
	Experimental Condition[b] (Dummy Code 2)	2.09	1.51	.10	.167	1.07	1.62	.07	.509
	Experimental Condition[c] (Dummy Code 3)	.11	1.47	.01	.943	N/A	N/A	N/A	N/A
	Analysis 2 – NEO-PI-R								
Step 1	I→I: $R^2 = .03$								
	T→T: $R^2 = .03$								
	Agreeableness	-.99	.46	-.17	.032	-1.13	.65	-.16	.085

(Table 48 continues)

(Table 48 continued)

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Conscientiousness	.20	.38	.04	.595	.29	.56	.05	.603
	Extraversion	.21	.37	.05	.580	.23	.51	.04	.658
	Neuroticism	-.08	.43	-.02	.845	-.16	.65	-.02	.809
	Openness	-.01	.35	.00	.977	.14	.56	.02	.799
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .15$* T→T: $\Delta R^2 = .06^{\dagger}$								
	Experimental Condition[a] (Dummy Code 1)	4.79	.93	.35	.000*	-1.69	.70	-.20	.016†
	Experimental Condition[b] (Dummy Code 2)	3.36	1.39	.17	.017†	2.27	1.36	.15	.098
	Experimental Condition[c] (Dummy Code 3)	1.49	1.32	.08	.261	N/A	N/A	N/A	N/A

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \le .011$.

[a] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (1), single culture American and mixed (-1), single culture Chinese and mixed (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (-1), single culture American and mixed (0), single culture Chinese and mixed (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American only (0), single culture Chinese only (0), single culture American and mixed (1), single culture Chinese and mixed (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 49. *Multiple Regression Results for Personality and Experimental Condition Predicting Coordination at Individual and Team Levels of Analysis*

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Analysis 1 – CPAI								
Step 1	I→I: R^2 = .11*								
	T→T: R^2 = .11								
	Adventurousness	.48	.40	.11	.230	.51	.77	.07	.509
	Face	.44	.29	.12	.130	.73	.52	.13	.161
	Family Orientation	-.50	.33	-.12	.137	-.20	.62	-.03	.751
	Flexibility	.54	.29	.15	.066	1.41	.61	.22	.023†
	Internal vs. External	-1.02	.37	-.22	.007*	-1.35	.73	-.18	.067
	Harmony	-.51	.38	-.12	.180	-.69	.70	-.10	.330
	Leadership	.04	.31	.01	.894	.10	.59	.02	.870
	Modernization	-.21	.38	-.04	.585	-.28	.73	-.04	.704
	Renqing	.53	.47	.10	.266	.45	.90	.05	.620
Step 2	Experimental Condition Variables								
	I→I: ΔR^2 = .14*								
	T→T: ΔR^2 = .09*								
	Experimental Condition[a] (Dummy Code 1)	.05	.05	.07	.331	-.11	.05	-.18	.024†
	Experimental Condition[b] (Dummy Code 2)	.46	.08	.40	.000*	.35	.11	.314	.002*
	Experimental Condition[c] (Dummy Code 3)	.12	.08	.11	.146	N/A	N/A	N/A	N/A
	Analysis 2 – NEO-PI-R								
Step 1	I→I: R^2 = .04								
	T→T: R^2 = .06								
	Agreeableness	.00	.03	-.01	.915	-.02	.05	-.03	.733

(Table 49 continues)

(Table 49 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Conscientiousness	.03	.02	.14	.106	.08	.04	.18	.053
	Extraversion	.02	.02	.09	.243	.02	.04	.05	.585
	Neuroticism	.03	.02	.12	.180	.07	.05	.14	.152
	Openness	.03	.02	.13	.108	.08	.04	.18	.050
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .21$*								
	T→T: $\Delta R^2 = .15$*								
	Experimental Condition[a] (Dummy Code 1)	.07	.05	.09	.173	-.12	.05	-.18	.016[†]
	Experimental Condition[b] (Dummy Code 2)	.51	.08	.45	.000*	.42	.09	.37	.000*
	Experimental Condition[c] (Dummy Code 3)	.14	.07	.13	.054	N/A	N/A	N/A	N/A

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (1), single culture American and mixed (-1), single culture Chinese and mixed (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (-1), single culture American and mixed (0), single culture Chinese and mixed (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American only (0), single culture Chinese only (0), single culture American and mixed (1), single culture Chinese and mixed (-1); this dummy code is not applicable for the T → T analysis.

[†] Denotes result approaching significance. Refer to text for further discussion.

Table 50. *Multiple Regression Results for Personality and Experimental Condition Predicting Decision Making at Individual and Team Levels of Analysis*

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Analysis 1 – CPAI								
Step 1	I→I: $R^2 = .14$*								
	T→T: $R^2 = .11$								
	Adventurousness	.97	.87	.10	.268	.99	1.30	.09	.449
	Face	.14	.64	.02	.832	.42	.88	.05	.633
	Family Orientation	-.70	.73	-.07	.343	-.38	1.06	-.03	.719
	Flexibility	.47	.65	.06	.467	.39	1.04	.04	.711
	Internal vs. External	-1.39	.82	-.13	.093	-1.58	1.24	-.12	.203
	Harmony	-1.91	.83	-.20	.023†	-2.01	1.19	-.18	.094
	Leadership	-.38	.68	-.04	.574	-.79	1.00	-.08	.430
	Modernization	-.46	.85	-.04	.586	.29	1.24	.02	.815
	Renqing	-.93	1.05	-.08	.373	-1.01	1.52	-.07	.509
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .02$								
	T→T: $\Delta R^2 = .05$†								
	Experimental Condition[a] (Dummy Code 1)	.19	.12	.11	.130	-.17	.09	-.16	.048
	Experimental Condition[b] (Dummy Code 2)	.18	.20	.07	.353	.36	.20	.19	.069
	Experimental Condition[c] (Dummy Code 3)	.26	.19	.11	.177	N/A	N/A	N/A	N/A
	Analysis 2 – NEO-PI-R								
Step 1	I→I: $R^2 = .02$								
	T→T: $R^2 = .04$								
	Agreeableness	-.11	.06	-.14	.079	-.18	.08	-.21	.028

(Table 50 continues)

(Table 50 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Conscientiousness	.00	.05	.00	.971	.03	.07	.05	.624
	Extraversion	-.02	.05	-.04	.663	-.04	.06	-.06	.521
	Neuroticism	-.02	.06	-.04	.685	.00	.08	.00	.993
	Openness	.03	.05	.05	.554	.09	.07	.12	.190
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .09$* T→T: $\Delta R^2 = .11$*								
	Experimental Condition[a] (Dummy Code 1)	.14	.12	.08	.257	-.16	.08	-.15	.064
	Experimental Condition[b] (Dummy Code 2)	.50	.19	.19	.008*	.63	.16	.33	.000*
	Experimental Condition[c] (Dummy Code 3)	.59	.18	.24	.001*	N/A	N/A	N/A	N/A

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (1), single culture American and mixed (-1), single culture Chinese and mixed (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (-1), single culture American and mixed (0), single culture Chinese and mixed (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American only (0), single culture Chinese only (0), single culture American and mixed (1), single culture Chinese and mixed (-1); this dummy code is not applicable for the T → T analysis.

[†] Denotes result approaching significance. Refer to text for further discussion.

Table 51. *Multiple Regression Results for Personality and Experimental Condition Predicting Feedback at Individual and Team Levels of Analysis*

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Analysis 1 – CPAI								
Step 1	I→I: $R^2 = .08$								
	T→T: $R^2 = .11$								
	Adventurousness	.49	.37	.12	.184	.51	.63	.09	.422
	Face	.28	.27	.09	.299	.35	.43	.08	.415
	Family Orientation	-.03	.31	-.01	.919	.12	.51	.02	.814
	Flexibility	.42	.28	.13	.130	1.00	.50	.19	.049
	Internal vs. External	.40	.35	.09	.252	.67	.60	.11	.269
	Harmony	-.54	.35	-.14	.125	-.77	.58	-.14	.183
	Leadership	-.09	.29	-.03	.745	.07	.49	.01	.887
	Modernization	-.07	.36	-.02	.854	.03	.60	.01	.955
	Renqing	.96	.44	.19	.032	1.76	.74	.25	.019[†]
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .02$								
	T→T: $\Delta R^2 = .00$								
	Experimental Condition[a] (Dummy Code 1)	-.06	.05	-.08	.281	-.03	.04	-.05	.549
	Experimental Condition[b] (Dummy Code 2)	.14	.08	.13	.100	.03	.10	.04	.735
	Experimental Condition[c] (Dummy Code 3)	-.01	.08	-.01	.877	N/A	N/A	N/A	N/A
	Analysis 2 – NEO-PI-R								
Step 1	I→I: $R^2 = .03$								
	T→T: $R^2 = .02$								
	Agreeableness	.03	.02	.10	.188	.04	.04	.10	.307

(Table 51 continues)

(Table 51 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Conscientiousness	.01	.02	.06	.492	.01	.03	.02	.814
	Extraversion	.03	.02	.11	.175	.02	.03	.06	.533
	Neuroticism	.03	.02	.13	.149	.05	.04	.12	.230
	Openness	.02	.02	.08	.318	.02	.03	.07	.479
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .01$								
	T→T: $\Delta R^2 = .01$								
	Experimental Condition[a] (Dummy Code 1)	-.01	.05	-.02	.798	-.04	.04	-.08	.364
	Experimental Condition[b] (Dummy Code 2)	.07	.08	.06	.395	-.01	.08	-.01	.935
	Experimental Condition[c] (Dummy Code 3)	-.05	.08	-.05	.515	N/A	N/A	N/A	N/A

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (1), single culture American and mixed (-1), single culture Chinese and mixed (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (-1), single culture American and mixed (0), single culture Chinese and mixed (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American only (0), single culture Chinese only (0), single culture American and mixed (1), single culture Chinese and mixed (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 52. *Multiple Regression Results for Personality and Experimental Condition Predicting Monitoring at Individual and Team Levels of Analysis*

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Analysis 1 – CPAI								
Step 1	I→I: R^2 = .04 T→T: R^2 = .11								
	Adventurousness	-.17	1.28	-.01	.897	.96	1.67	.06	.566
	Face	-.63	.93	-.06	.500	.07	1.13	.01	.951
	Family Orientation	.87	1.07	.07	.418	3.34	1.36	.22	.015[†]
	Flexibility	-.01	.95	.00	.989	-.73	1.34	-.05	.584
	Internal vs. External	-.54	1.21	-.04	.653	.38	1.59	.02	.810
	Harmony	-.71	1.21	-.05	.560	-.98	1.53	-.07	.524
	Leadership	.89	1.00	.07	.374	-1.43	1.29	-.11	.269
	Modernization	-.10	1.24	-.01	.937	.28	1.59	.02	.860
	Renqing	-2.23	1.53	-.13	.146	-5.25	1.96	-.28	.008*
Step 2	Experimental Condition Variables I→I: ΔR^2 = .01 T→T: ΔR^2 = .00								
	Experimental Condition[a] (Dummy Code 1)	-.21	.18	-.09	.243	.02	.11	.02	.839
	Experimental Condition[b] (Dummy Code 2)	-.14	.29	-.04	.641	-.18	.26	-.07	.489
	Experimental Condition[c] (Dummy Code 3)	.20	.28	.06	.483	N/A	N/A	N/A	N/A
	Analysis 2 – NEO-PI-R								
Step 1	I→I: R^2 = .03 T→T: R^2 = .02								
	Agreeableness	-.11	.08	-.10	.182	-.10	.10	-.09	.361

(Table 52 continues)

(Table 52 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Conscientiousness	.07	.07	.08	.316	.06	.09	.07	.472
	Extraversion	.07	.07	.09	.292	.04	.08	.04	.662
	Neuroticism	-.02	.08	-.02	.833	.02	.10	.02	.881
	Openness	.03	.06	.04	.580	.07	.09	.07	.465
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .02$ T→T: $\Delta R^2 = .00$								
	Experimental Condition[a] (Dummy Code 1)	-.24	.18	-.10	.173	.05	.12	.03	.682
	Experimental Condition[b] (Dummy Code 2)	-.02	.27	-.01	.928	-.08	.22	-.03	.708
	Experimental Condition[c] (Dummy Code 3)	.30	.25	.09	.233	N/A	N/A	N/A	N/A

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (1), single culture American and mixed (-1), single culture Chinese and mixed (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (-1), single culture American and mixed (0), single culture Chinese and mixed (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American only (0), single culture Chinese only (0), single culture American and mixed (1), single culture Chinese and mixed (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 53. *Multiple Regression Results for Personality and Experimental Condition Predicting Situational Awareness at Individual and Team Levels of Analysis*

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Analysis 1 – CPAI								
Step 1	I→I: $R^2 = .18$*								
	T→T: $R^2 = .15$*								
	Adventurousness	1.80	2.33	.07	.442	-1.68	3.81	-.05	.659
	Face	-1.00	1.70	-.05	.555	-.23	2.58	-.01	.928
	Family Orientation	-3.03	1.96	-.11	.124	-.89	3.09	-.03	.773
	Flexibility	1.82	1.73	.08	.296	1.76	3.05	.06	.564
	Internal vs. External	-5.56	2.20	-.20	.012†	-9.03	3.63	-.23	.014†
	Harmony	-4.21	2.22	-.16	.059	-2.88	3.48	-.08	.410
	Leadership	2.01	1.82	.09	.272	.03	2.94	.00	.993
	Modernization	1.46	2.26	.05	.520	3.53	3.62	.09	.332
	Renqing	-.50	2.79	-.02	.859	-5.76	4.46	-.13	.199
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .05$†								
	T→T: $\Delta R^2 = .03$								
	Experimental Condition[a] (Dummy Code 1)	.16	.32	.03	.624	-.15	.25	-.05	.548
	Experimental Condition[b] (Dummy Code 2)	.11	.52	.02	.829	1.31	.58	.23	.024†
	Experimental Condition[c] (Dummy Code 3)	1.66	.50	.25	.001*	N/A	N/A	N/A	N/A
	Analysis 2 – NEO-PI-R								
Step 1	I→I: $R^2 = .05$								
	T→T: $R^2 = .06$								
	Agreeableness	-.05	.16	-.02	.771	-.03	.24	-.01	.909

(Table 53 continues)

(Table 53 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Conscientiousness	-.05	.13	-.03	.726	.12	.21	.06	.549
	Extraversion	.20	.13	.13	.112	.20	.19	.09	.292
	Neuroticism	.16	.15	.10	.276	.47	.24	.19	.053
	Openness	.25	.12	.16	.037	.37	.20	.17	.069
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .13$* T→T: $\Delta R^2 = .09$*								
	Experimental Condition[a] (Dummy Code 1)	.04	.33	.01	.901	-.09	.25	-.03	.715
	Experimental Condition[b] (Dummy Code 2)	.75	.49	.11	.124	1.91	.49	.33	.000*
	Experimental Condition[c] (Dummy Code 3)	2.41	.46	.36	.000*	N/A	N/A	N/A	N/A

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (1), single culture American and mixed (-1), single culture Chinese and mixed (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (-1), single culture American and mixed (0), single culture Chinese and mixed (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American only (0), single culture Chinese only (0), single culture American and mixed (1), single culture Chinese and mixed (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 54. *Multiple Regression Results for Personality and Experimental Condition Predicting Team Leadership at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – CPAI								
Step 1	I→I: $R^2 = .05$								
	T→T: $R^2 = .07$								
	Adventurousness	.61	2.68	.02	.820	-.85	3.54	-.03	.811
	Face	-1.71	1.95	-.07	.384	-.61	2.40	-.02	.799
	Family Orientation	2.84	2.25	.10	.210	6.73	2.88	.22	.021[†]
	Flexibility	-.12	2.00	-.01	.954	-.50	2.84	-.02	.859
	Internal vs. External	-1.25	2.53	-.04	.621	4.63	3.38	.14	.173
	Harmony	-3.90	2.55	-.14	.128	-4.97	3.24	-.16	.128
	Leadership	1.92	2.10	.08	.361	-1.33	2.73	-.05	.628
	Modernization	.65	2.60	.02	.803	-.59	3.37	-.02	.862
	Renqing	-1.29	3.21	-.04	.689	-4.53	4.15	-.12	.277
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .08$*								
	T→T: $\Delta R^2 = .00$								
	Experimental Condition[a] (Dummy Code 1)	.03	.37	.01	.926	.08	.24	.03	.743
	Experimental Condition[b] (Dummy Code 2)	-1.26	.59	-.17	.034	.32	.55	.06	.556
	Experimental Condition[c] (Dummy Code 3)	1.76	.57	.25	.002*	N/A	N/A	N/A	N/A
	Analysis 2 – NEO-PI-R								
Step 1	I→I: $R^2 = .03$								
	T→T: $R^2 = .03$								
	Agreeableness	-.26	.17	-.12	.139	-.27	.22	-.12	.216

(Table 54 continues)

(Table 54 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Conscientiousness	.12	.14	.07	.396	.12	.19	.06	.513
	Extraversion	.04	.14	.03	.746	.03	.17	.02	.871
	Neuroticism	-.11	.16	-.06	.478	.26	.22	.12	.227
	Openness	.14	.13	.08	.288	.01	.18	.01	.960
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .09$* T→T: $\Delta R^2 = .00$								
	Experimental Condition[a] (Dummy Code 1)	-.06	.36	-.01	.878	.06	.24	.02	.800
	Experimental Condition[b] (Dummy Code 2)	-1.02	.54	-.14	.061	.01	.46	.00	.976
	Experimental Condition[c] (Dummy Code 3)	2.00	.51	.28	.000*	N/A	N/A	N/A	N/A

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (1), single culture American and mixed (-1), single culture Chinese and mixed (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (-1), single culture American and mixed (0), single culture Chinese and mixed (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American only (0), single culture Chinese only (0), single culture American and mixed (1), single culture Chinese and mixed (-1); this dummy code is not applicable for the T → T analysis.

[†] Denotes result approaching significance. Refer to text for further discussion.

Table 55. *Multiple Regression Results for Personality and Experimental Condition Predicting Communication Errors at Individual and Team Levels of Analysis*

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Analysis 1 – CPAI								
Step 1	I→I: $R^2 = .11$*								
	T→T: $R^2 = .16$*								
	Adventurousness	-.50	.82	-.06	.543	-.86	1.09	-.09	.431
	Face	-.31	.60	-.04	.604	-1.39	.74	-.17	.062
	Family Orientation	.68	.69	.08	.324	.39	.89	.04	.657
	Flexibility	-.32	.61	-.04	.604	-1.11	.87	-.12	.206
	Internal vs. External	1.59	.78	.17	.042	2.64	1.04	.24	.012*
	Harmony	2.14	.78	.24	.007*	2.41	1.00	.24	.017*
	Leadership	-.79	.64	-.10	.224	-.54	.84	-.06	.520
	Modernization	-.75	.80	-.07	.351	.22	1.04	.02	.834
	Renqing	-1.82	.99	-.16	.066	-.60	1.28	-.05	.638
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .05$*								
	T→T: $\Delta R^2 = .04$*								
	Experimental Condition[a] (Dummy Code 1)	.04	.12	.02	.749	.17	.07	.19	.017*
	Experimental Condition[b] (Dummy Code 2)	-.54	.18	-.23	.004*	-.19	.16	-.12	.240
	Experimental Condition[c] (Dummy Code 3)	-.37	.18	-.16	.042	N/A	N/A	N/A	N/A
	Analysis 2 – NEO-PI-R								
Step 1	I→I: $R^2 = .03$								
	T→T: $R^2 = .11$*								
	Agreeableness	.03	.06	.04	.634	.18	.07	.24	.009*

(Table 55 continues)

(Table 55 continued)

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Conscientiousness	.01	.05	.02	.778	-.04	.06	-.06	.534
	Extraversion	-.03	.04	-.05	.523	-.02	.05	-.03	.720
	Neuroticism	.02	.05	.04	.667	.06	.07	.08	.378
	Openness	-.07	.04	-.13	.096	-.18	.06	-.28	.003*
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .10$* T→T: $\Delta R^2 = .09$*								
	Experimental Condition[a] (Dummy Code 1)	.02	.11	.02	.833	.17	.07	.18	.018*
	Experimental Condition[b] (Dummy Code 2)	-.62	.17	-.26	.000*	-.41	.14	-.25	.003*
	Experimental Condition[c] (Dummy Code 3)	-.47	.16	-.21	.005*	N/A	N/A	N/A	N/A

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (1), single culture American and mixed (-1), single culture Chinese and mixed (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (-1), single culture American and mixed (0), single culture Chinese and mixed (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American only (0), single culture Chinese only (0), single culture American and mixed (1), single culture Chinese and mixed (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 56. *Multiple Regression Results for Personality and Experimental Condition Predicting Non-Compliance Errors at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – CPAI								
Step 1	I→I: R^2 = .05								
	T→T: R^2 = .08								
	Adventurousness	.25	.92	.03	.788	.49	1.18	.05	.681
	Face	.62	.67	.08	.353	.33	.80	.04	.684
	Family Orientation	1.33	.77	.14	.087	.61	.96	.06	.522
	Flexibility	.56	.68	.07	.418	-.60	.94	-.06	.526
	Internal vs. External	.59	.87	.06	.496	1.93	1.12	.17	.088
	Harmony	1.28	.87	.13	.145	1.40	1.08	.14	.195
	Leadership	-.63	.72	-.07	.381	-.84	.91	-.09	.355
	Modernization	-.37	.89	-.03	.675	1.85	1.12	.15	.100
	Renqing	-.62	1.10	-.05	.574	.63	1.38	.05	.646
Step 2	Experimental Condition Variables								
	I→I: ΔR^2 = .01								
	T→T: ΔR^2 = .00								
	Experimental Condition[a] (Dummy Code 1)	-.11	.13	-.06	.426	.03	.08	.03	.737
	Experimental Condition[b] (Dummy Code 2)	-.14	.21	-.05	.507	.05	.18	.03	.796
	Experimental Condition[c] (Dummy Code 3)	-.09	.20	-.04	.665	N/A	N/A	N/A	N/A
	Analysis 2 – NEO-PI-R								
Step 1	I→I: R^2 = .02								
	T→T: R^2 = .07								
	Agreeableness	.08	.06	.11	.164	.21	.07	.27	.003*

(Table 56 continues)

(Table 56 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Conscientiousness	-.02	.05	-.03	.718	-.08	.06	-.12	.218
	Extraversion	.04	.05	.07	.396	.05	.06	.08	.365
	Neuroticism	-.03	.06	-.05	.599	.07	.07	.09	.335
	Openness	-.06	.05	-.10	.217	-.08	.06	-.12	.211
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .02$ T→T: $\Delta R^2 = .02$								
	Experimental Condition[a] (Dummy Code 1)	-.09	.13	-.05	.462	.02	.08	.02	.805
	Experimental Condition[b] (Dummy Code 2)	-.29	.19	-.11	.135	-.24	.15	-.14	.120
	Experimental Condition[c] (Dummy Code 3)	-.24	.18	-.10	.185	N/A	N/A	N/A	N/A

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (1), single culture American and mixed (-1), single culture Chinese and mixed (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (-1), single culture American and mixed (0), single culture Chinese and mixed (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American only (0), single culture Chinese only (0), single culture American and mixed (1), single culture Chinese and mixed (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 57. *Multiple Regression Results for Personality and Experimental Condition Predicting Operational Decision Errors at Individual and Team Levels of Analysis*

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Analysis 1 – CPAI								
Step 1	I→I: R^2 = .02								
	T→T: R^2 = .04								
	Adventurousness	-.43	.45	-.09	.333	-.57	.72	-.09	.428
	Face	-.37	.33	-.10	.258	-.17	.49	-.04	.721
	Family Orientation	.28	.38	.06	.451	.16	.58	.03	.783
	Flexibility	-.23	.33	-.06	.494	-.59	.57	-.10	.308
	Internal vs. External	.21	.42	.04	.612	.57	.68	.08	.401
	Harmony	.18	.42	.04	.675	.17	.66	.03	.802
	Leadership	.03	.35	.01	.933	.05	.55	.01	.926
	Modernization	.13	.43	.03	.760	1.10	.68	.15	.108
	Renqing	-.35	.53	-.06	.508	-.08	.84	-.01	.929
Step 2	Experimental Condition Variables								
	I→I: ΔR^2 = .03								
	T→T: ΔR^2 = .00								
	Experimental Condition[a] (Dummy Code 1)	.03	.06	.04	.640	-.01	.05	-.02	.786
	Experimental Condition[b] (Dummy Code 2)	-.23	.10	-.19	.022*	-.08	.11	-.07	.497
	Experimental Condition[c] (Dummy Code 3)	.04	.10	.03	.711	N/A	N/A	N/A	N/A
	Analysis 2 – NEO-PI-R								
Step 1	I→I: R^2 = .01								
	T→T: R^2 = .02								
	Agreeableness	.02	.03	.06	.434	.06	.04	.13	.167

(Table 57 continues)

(Table 57 continued)

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Conscientiousness	.01	.02	.05	.539	.02	.04	.05	.597
	Extraversion	.00	.02	-.01	.938	.01	.03	.04	.676
	Neuroticism	.01	.03	.04	.624	.04	.04	.10	.311
	Openness	.02	.02	.07	.392	-.01	.04	-.02	.861
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .04$ T→T: $\Delta R^2 = .02$								
	Experimental Condition[a] (Dummy Code 1)	.02	.06	.03	.691	-.01	.05	-.03	.758
	Experimental Condition[b] (Dummy Code 2)	-.25	.09	-.21	.006*	-.14	.09	-.14	.127
	Experimental Condition[c] (Dummy Code 3)	-.01	.09	-.01	.879	N/A	N/A	N/A	N/A

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (1), single culture American and mixed (-1), single culture Chinese and mixed (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (-1), single culture American and mixed (0), single culture Chinese and mixed (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American only (0), single culture Chinese only (0), single culture American and mixed (1), single culture Chinese and mixed (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 58. *Multiple Regression Results for Personality and Experimental Condition Predicting Proficiency Errors at Individual and Team Levels of Analysis*

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Analysis 1 – CPAI								
Step 1	I→I: $R^2 = .05$								
	T→T: $R^2 = .10$								
	Adventurousness	-.08	1.53	-.01	.959	-3.65	2.07	-.20	.080
	Face	-1.27	1.11	-.10	.254	-1.90	1.40	-.13	.179
	Family Orientation	.47	1.28	.03	.717	2.43	1.68	.13	.151
	Flexibility	-.72	1.14	-.06	.525	1.33	1.66	.08	.423
	Internal vs. External	.85	1.44	.05	.558	.13	1.97	.01	.950
	Harmony	1.38	1.45	.09	.344	2.89	1.90	.16	.129
	Leadership	-2.31	1.19	-.16	.054	-1.29	1.60	-.08	.422
	Modernization	1.68	1.48	.09	.258	1.79	1.97	.08	.366
	Renqing	.40	1.83	.02	.826	-2.99	2.43	-.13	.220
	Experimental Condition Variables								
	I→I: $\Delta R^2 = .01$								
	T→T: $\Delta R^2 = .01$								
	Experimental Condition[a] (Dummy Code 1)	.21	.22	.07	.328	-.14	.14	-.08	.316
	Experimental Condition[b] (Dummy Code 2)	-.18	.35	-.04	.616	-.04	.32	-.01	.899
	Experimental Condition[c] (Dummy Code 3)	-.20	.34	-.05	.566	N/A	N/A	N/A	N/A
	Analysis 2 – NEO-PI-R								
Step 1	I→I: $R^2 = .03$								
	T→T: $R^2 = .03$								
	Agreeableness	.08	.10	.07	.405	.19	.13	.14	.148

(Table 58 continues)

(Table 58 continued)

	Measure	I→I B	SEB	β	p	T→T B	SEB	β	p
	Conscientiousness	-.07	.08	-.08	.360	-.11	.11	-.09	.338
	Extraversion	-.06	.08	-.06	.456	-.07	.10	-.06	.516
	Neuroticism	.06	.09	.06	.487	.05	.13	.04	.713
	Openness	.07	.07	.08	.333	-.01	.11	-.01	.908
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .02$ T→T: $\Delta R^2 = .01$								
	Experimental Condition[a] (Dummy Code 1)	.17	.21	.06	.441	-.12	.14	-.07	.413
	Experimental Condition[b] (Dummy Code 2)	-.33	.32	-.08	.307	-.20	.27	-.07	.473
	Experimental Condition[c] (Dummy Code 3)	-.38	.30	-.10	.210	N/A	N/A	N/A	N/A

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (1), single culture American and mixed (-1), single culture Chinese and mixed (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American only (1), single culture Chinese only (-1), single culture American and mixed (0), single culture Chinese and mixed (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American only (0), single culture Chinese only (0), single culture American and mixed (1), single culture Chinese and mixed (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Cognition

Individual Level of Analysis. I→I results represent the individual level of analysis. Individual level responses are used to predict ratings of individual team behaviors and error behaviors. For each team and error behavior, we entered scales measuring field dependence/independence (EFT) and task load (TLX) in step one. This analysis depicts the influence of individual differences on each criterion. In step two, we entered dummy coded variables representing the experimental condition. This analysis depicts influence of the experimental manipulation after controlling for the influence of variables entered in step one. For participants who completed two scenarios, the mean of each team and error behavior was used in regression analyses. For participants who completed one scenario, we used the frequency of each team and error behavior in analysis. There were a total of 196 participants, so the N for EFT analyses is 196. For TLX analyses, N is 298. TLX was administered after each scenario was completed. Participants who completed two scenarios had two sets of TLX scores. We treated each scenario as an independent observation for TLX analyses. Therefore, while there were only 196 participants in our sample, there were 298 scenarios. Correlations for all variables used in EFT analyses are presented in Table 59. Correlations for all variables used in TLX analyses are presented in Table 60. For T→T analyses, described below, shared mental model (SMM), which is an indicator of team cognition and can only be measured at the team level, was entered into the equation in step one, followed by entry of dummy coded variables representing the experimental condition.

Assertiveness

In step one of Analysis 1, the beta weight for EFT and the amount of variance explained in assertiveness in step one nearly reached the Bonferroni adjusted level of significance ($\beta = -.18, p = .015; R^2 = .03, p = .015$; see Table 62). Participants who are more field independent were more assertive. In step two, experimental condition explained variance in assertiveness ($\Delta R^2 = .08, p < .011$). Dummy code 1 was significant ($\beta = .23, p = .001$). Participants in single culture teams demonstrated more assertiveness than participants in the combination of single culture and mixed culture teams. The final equation was significant F (4, 187) = 5.50, $p = .000$.

In step one of Analysis 3, TLX scores explained ten percent of the variance in team assertiveness, which exceeded the Bonferroni adjusted level of significance ($R^2 = .10, p \leq .001$). Three TLX scales were significantly related to assertiveness: effort ($\beta = .25, p = .002$), performance ($\beta = .16, p = .005$), and physical workload ($\beta = -.30, p = .000$). Individuals reporting greater effort and performance and less physical workload demonstrated greater assertiveness. Experimental condition entered in the second step of Analysis 3 did not explain additional variance in assertiveness ($\Delta R^2 = .01$, *n.s.*). The final equation was significant, F (8, 282) = 4.65, $p = .000$.

Backup

In step one of Analysis 1, EFT did not explain a significant portion of variance in backup ($R^2 = .00$, *n.s.*; see Table 63). Experimental condition entered in step two of Analysis 1 explained significantly more variation ($\Delta R^2 = .06, p \leq .011$). Dummy code 2 was significant ($\beta = -.21, p = .004$). Participants in single culture Chinese teams demonstrated

more backup behavior than participants in single culture American teams. The final equation approached the Bonferroni adjusted level of significance, F (4, 187) = 2.91, p = .023.

In Analysis 3, neither TLX scores (R^2 = .03, *n.s.*) nor experimental condition (ΔR^2 = .02, *n.s.*) explained significant variance in backup. Dummy code 2 in step two approached the Bonferroni adjusted level of significance (β = -.15, p = .016). Participants in single culture Chinese teams demonstrated more backup than participants in single culture American teams. The final equation was not significant, F (8, 282) = 1.97, p = .051.

Communication

In step one of Analysis 1, EFT did not explain significant variance in communication (R^2 = .00, *n.s.*; see Table 64). In step two of Analysis 1, experimental condition explained significantly more variance in communication (ΔR^2 = .16, $p \leq$ .011). Dummy code 1 was significant (β = .35, p = .000). Participants in single culture teams communicated more than participants in the combination of single culture and mixed culture teams. Dummy code 2 was also significant (β = .18, p = .010). Participants in single culture American teams communicated more than participants in single culture Chinese teams. The final equation was significant, F (4, 187) = 8.99, p = .000.

In step one of Analysis 3, TLX explained a significant portion of variance in communication (R^2 = .06, $p \leq$ .011). Performance was a significant predictor (β = .18, p = .002). Participants reporting better performance communicated more frequently. The beta weight for physical workload nearly reached the Bonferroni adjusted level of significance (β = -.16, p = .018). Participants reporting fewer physical demands communicated more frequently. Experimental condition in step two of Analysis 3 explained a significant amount of additional variance in communication (ΔR^2 = .04, $p \leq$ .011). Dummy code 1 was significant (β = -.17, p = .004). Participants in single culture teams communicated more than participants in mixed culture teams after controlling for task load. The final equation was significant, F (8, 282) = 3.89, p = .000.

Coordination

In step one of Analysis 1, EFT did not explain significant variance in coordination (R^2 = .00, *n.s.*; see Table 65). In step two of Analysis 1, experimental condition explained significantly more variance (ΔR^2 = .22, $p \leq$ .011). Dummy code 2 was significant (β = .44, p = .000). Participants in single culture American teams were better coordinated than participants in single culture Chinese teams. The final equation was significant, F (4, 187) = 13.02, p = .000.

In step one of Analysis 3, TLX did not explain significance variance in coordination (R^2 = .05, *n.s.*). The regression weight for physical workload was significant (β = -.22, p = .001). Participants reporting less physical workload demonstrated better coordination. Experimental condition entered in step two of Analysis 3 explained significant unique variance in coordination (ΔR^2 = .14, $p \leq$ .011). Dummy code 1 (β = -.16, p = .003) and dummy code 2 (β = .34, p = .000) were significant. Participants in single culture teams were better coordinated than participants in mixed culture teams. Also, participants in single

culture American teams demonstrated better coordination than participants in single culture Chinese teams. The final equation was significant, F (8, 282) = 7.89, p = .000.

Decision Making

In step one of Analysis 1, EFT did not explain significant variance in decision making (R^2 = .02, *n.s.*; see Table 66). In step two of Analysis 1, experimental condition explained significantly more variance (ΔR^2 = .09, $p \leq .011$). Dummy code 2 (β = .19, p = .007) and dummy code 3 (β = .21, p = .003) were significant. Participants in single culture American teams made more decisions than participants in single culture Chinese teams. Participants in the combination of single culture American teams and mixed teams made more decisions than participants in the combination of single culture Chinese and mixed teams. The final equation was significant, F (4, 187) = 5.74, p = .000.

In step one of Analysis 3, TLX approached the Bonferroni adjusted significance level (R^2 = .05, p = .019). Physical workload was a significant predictor (β = -.23, p = .001). Participants reporting less physical workload made more decisions. Experimental condition entered in step two of Analysis 3 explained significant additional variance in decision making (ΔR^2 = .05, $p \leq .011$). Dummy code 2 was significant (β = .19, p = .001). Participants in single culture American teams made more decisions than participants in single culture Chinese teams. The final equation was significant, F (8, 282) = 3.87, p = .000.

Feedback

In Analysis 1, neither EFT (R^2 = .00, *n.s.*; see Table 67) nor experimental condition (ΔR^2 = .01, *n.s.*) explained significant variance in feedback. The final equation was not significant, F (4, 187) = .62, p = .652.

In step one of Analysis 3, TLX did not explain variance in feedback (R^2 = .03, *n.s.*). The beta weight for mental workload approached the Bonferroni adjusted significance level (β = .18, p = .021). Participants reporting greater mental workload demonstrated more feedback. In step 2 of Analysis 3, experimental condition did not explain significant variance in feedback (ΔR^2 = .01, *n.s.*). The final equation was not significant, F (8, 282) = 1.37, p = .208.

Monitoring

In Analysis 1, neither EFT (R^2 = .01, *n.s.*; see Table 68) nor experimental condition (ΔR^2 = .02, *n.s.*) explained significant variance in monitoring. The final equation was not significant, F (4, 187) = 1.44, p = .221.

In step one of Analysis 3, TLX explained significant variance in monitoring (R^2 = .07, $p \leq .011$). Physical workload predicted monitoring (β = -.28, p = .000). Participants reporting greater physical workload demonstrated fewer monitoring behaviors. In step 2 of Analysis 3, experimental condition did not explain significant variance in monitoring (ΔR^2 = .01, *n.s.*). The final equation was significant, F (8, 282) = 2.79, p = .006.

Situational Awareness

In step one of Analysis 1, EFT did not explain significant variance in situational awareness ($R^2 = .01$, *n.s.*; see Table 69). In step two of Analysis 1, experimental condition explained unique variance ($\Delta R^2 = .16, p \leq .011$). Dummy code 3 was significant ($\beta = .38, p = .000$). Participants in combined single culture American and mixed culture teams demonstrated more situational awareness than participants in combined single culture Chinese and mixed culture teams. The final equation was significant, $F\,(4, 187) = 9.50, p = .000$.

In step one of Analysis 3, TLX explained significant variance in situation awareness ($R^2 = .06, p \leq .011$). Physical workload predicted situation awareness ($\beta = -.26$, p = .000). Participants reporting greater physical workload demonstrated less situational awareness. Experimental condition entered in step two of Analysis 3 explained a significant amount of additional variance in coordination ($\Delta R^2 = .05, p \leq .011$). Dummy code 2 was a significant predictor ($\beta = .24, p = .000$). Participants in single culture American teams demonstrated more situational awareness than participants in single culture Chinese teams. The final equation was significant, $F\,(8, 282) = 4.58, p = .000$.

Team Leadership

In step one of Analysis 1, the beta weight for EFT and the amount of variance explained in step one approached the Bonferroni adjusted level of significance ($R^2 = .03, p = .023$; $\beta = -.16, p = .023$; see Table 70). Participants who are more field independent demonstrated more team leadership. In step two of Analysis 1, experimental condition explained significant unique variance in leadership ($\Delta R^2 = .10, p \leq .011$). Dummy code 3 was significant ($\beta = .30, p = .000$). Participants in the combination of single culture American and mixed culture teams demonstrated more team leadership compared to participants in the combination of single culture Chinese and mixed culture teams. The final equation was significant, $F\,(4, 187) = 6.56, p = .000$.

In step one of Analysis 3, TLX explained significant variance in team leadership ($R^2 = .07, p \leq .011$). Physical workload was a significant predictor of team leadership ($\beta = -.21, p = .002$). Participants reporting greater physical workload demonstrated less team leadership. In step two of Analysis 3, experimental condition did not explain significant variance in team leadership ($\Delta R^2 = .01$, *n.s.*). The final equation was significant, $F\,(8, 282) = 2.71, p = .007$.

Communication Errors

In step one of Analysis 1, EFT did not explain significant variance in communication errors ($R^2 = .01$, *n.s.*; see Table 71). In step two of Analysis 1, experimental condition explained significant variance in communication errors ($\Delta R^2 = .12, p \leq .025$). The regression coefficient for dummy code 2 was significant ($\beta = -.28, p = .000$). Participants in single culture American teams made fewer communication errors than participants in single culture Chinese teams. The regression coefficient for dummy code 3 was also significant ($\beta = -.22, p = .002$). Participants in the combined single culture American and mixed culture teams made fewer communication errors than participants in the combined single culture Chinese and mixed culture teams. The final equation was significant, $F\,(4, 187) = 7.35, p = .000$.

In step one of Analysis 3, TLX did not explain significant variance in communication errors (R^2 = .02, *n.s.*). In step two of Analysis 3, experimental condition explained significant unique variance in communication errors (ΔR^2 = .05, $p \leq .025$). The regression coefficient for dummy code 2 was significant (β = -.21, p = .001). Participants in single culture American teams made fewer communication errors than participants in single culture Chinese teams. The final equation was significant, F (8, 282) = 2.57, p = .010.

Non-Compliance Errors

In Analysis 1, neither EFT (R^2 = .00, *n.s.*; see Table 72) nor experimental condition (ΔR^2 = .02, *n.s.*) explained significant variance in non-compliance errors. The final equation was not significant, F (4, 187) = 1.01, p = .401.

In Analysis 3, neither TLX (R^2 = .01, *n.s.*) nor experimental condition (ΔR^2 = .01, *n.s.*) explained significant variance in non-compliance errors. The final equation was not significant, F (8, 282) = .72, p = .678.

Operational Decision Errors

In step one of Analysis 1, EFT did not explain significant variance in operational decision errors (R^2 = .00, *n.s.*; see Table 73). In step two of Analysis 1, experimental condition did not explain significant unique variation in non-compliance errors (ΔR^2 = .04, *n.s.*). The regression coefficient for dummy code 2 was significant (β = -.19, p = .008). Participants in single culture American teams made fewer operational decision errors than participants in single culture Chinese teams. The final equation was not significant, F (4, 187) = 1.82, p = .127.

In Analysis 3, neither TLX (R^2 = .02, *n.s.*) nor experimental condition (ΔR^2 = .01, *n.s.*) explained a significant portion of variance in operational decision errors. The final equation was not significant, F (8, 282) = .87, p = .545.

Proficiency Errors

In Analysis 1, neither EFT (R^2 = .00, *n.s.*; see Table 74) nor experimental condition (ΔR^2 = .02, *n.s.*) explained significant variance in proficiency errors. The final equation was not significant, F (4, 187) = .71, p = .588.

In Analysis 3, neither TLX (R^2 = .03, *n.s.*) nor experimental condition (ΔR^2 = .00, *n.s.*) explained a significant portion of variance in proficiency errors. The final equation was not significant, F (8, 282) = 1.11, p = .354.

Team Level of Analysis. T→T results represent the team level of analysis. Individual level responses were aggregated to create average ratings for each team for each predictor and criterion. For each team and error behavior, we entered team average scores calculated from scales measuring EFT, shared mental model (SMM), and TLX in step one. This analysis depicts the influence of these factors at the team level of analysis. In step two, we entered dummy coded variables representing the experimental condition. This analysis depicts the influence of the experimental manipulation after controlling for the influence of

cognitive skills and demands. The total N for this level of analysis is 149. Correlations for all variables used in these analyses are presented in Table 61.

Assertiveness

In step one of Analysis 1, the beta weight for EFT and the amount of variance in assertiveness explained in step one exceeded the Bonferroni adjusted level of significance (β = -.24, p = .003; R^2 = .06, p = .003; see Table 62). Teams that were more field independent were more assertive. In step 2 of Analysis 1, the amount of variance in assertiveness explained by experimental condition approached the Bonferroni adjusted level of significance (ΔR^2 = .05, p = .022). The final equation was significant, F (3, 145) = 5.66, p = .001.

In Analysis 2, neither SMM (R^2 = .02, *n.s.*) nor experimental condition (ΔR^2 = .04, *n.s.*) explained significant variance in assertiveness. The overall equation was not significant, F (3, 142) = 3.14, p = .027.

In step one of Analysis 3, TLX explained significant variance in assertiveness (R^2 = .15, $p \leq$ .011). Three TLX scales were significantly related to assertiveness: effort (β = .38, p = .002), performance (β = .22, p = .006), and physical workload (β = -.32, p = .002). Teams reporting greater effort and performance and less physical workload were more assertive. Introduction of experimental condition in step two of Analysis 3 did not explain additional variance in assertiveness (ΔR^2 = .02, *n.s.*). The final equation was significant, F (8, 140) = 3.38, p = .001.

Backup

In Analysis 1, neither EFT (R^2 = .00, *n.s.*; see Table 63) nor experimental condition (ΔR^2 = .03, *n.s.*) explained significant variance in backup. The overall equation was not significant, F (3, 145) = 1.55, p = .204.

In Analysis 2, neither SMM (R^2 = .01, *n.s.*) nor experimental condition (ΔR^2 = .03, *n.s.*) explained a significant portion of variance in backup. The final equation was not significant, F (3, 142) = 1.87, p = .138.

In Analysis 3, neither TLX (R^2 = .03, *n.s.*) nor experimental condition (ΔR^2 = .01, *n.s.*) explained significant variance in backup. The final equation was not significant, F (8, 140) = 1.90, p = .065.

Communication

In step one of Analysis 1, EFT did not explain significant variance in team communication (R^2 = .03, *n.s.*; see Table 64). In step two of Analysis 1, experimental condition explained unique variance (ΔR^2 = .07, $p \leq$ .011). Dummy code 1 was significant (β = -.20, p = .011). Single culture teams communicated more frequently than mixed culture teams. The overall equation was significant, F (3, 145) = 4.87, p = .003.

In step one of Analysis 2, SMM did not explain variance in communication (R^2 = .01, *n.s.*). In step two of Analysis 2, experimental condition explained significantly more

variance in communication ($\Delta R^2 = .07, p \leq .011$). The regression coefficient for dummy code 1 was significant ($\beta = -.21, p = .011$). Single culture teams communicated more frequently than mixed culture teams. The overall equation nearly reached the Bonferroni adjusted significance level, $F(3, 142) = 3.78, p = .012$.

In step one of Analysis 3, TLX explained a significant portion of variance in communication ($R^2 = .12, p \leq .011$). Effort ($\beta = .33, p = .009$) and performance ($\beta = 0.26, p = .002$) were significant predictors. Teams that reported greater effort and better performance communicated more. Experimental condition entered in step two of Analysis 3 did not explain significant unique variance in communication ($\Delta R^2 = .04$, *n.s.*). The final equation was significant $F(8, 140) = 3.22, p = .002$.

Coordination

In step one of Analysis 1, EFT did not explain significant variance in team coordination ($R^2 = .00$, *n.s.*; see Table 65). In step two of Analysis 1, experimental condition explained significantly more variance in coordination ($\Delta R^2 = .17, p \leq .011$). The beta weight for dummy code 1 approached the Bonferroni adjusted level of significance ($\beta = -.18, p = .019$). Single culture teams were better coordinated than mixed culture teams. Dummy code 2 was a significant predictor of coordination ($\beta = .37$, p = .000). Single culture American teams demonstrated better coordination than single culture Chinese teams. The final equation was significant, $F(3, 145) = 10.00, p = .000$.

In step one of Analysis 2, the regression coefficient for SMM was significant ($\beta = 0.29, p = .000$) as was the amount of total variance explained in coordination ($R^2 = .08, p \leq .001$). Teams that had a better shared mental model of the task were better coordinated. In step two of Analysis 2, experimental condition explained additional variance in coordination ($\Delta R^2 = .15, p \leq .011$). The regression coefficient for dummy code 1 nearly reached the Bonferroni adjusted level of significance ($\beta = -.18, p = .017$). Single culture teams were better coordinated than mixed culture teams. Dummy code 2 was significant predictor as well ($\beta = .34, p = .000$). Single culture American teams demonstrated better coordination than single culture Chinese teams. The overall equation was significant, $F(3, 142) = 14.24, p = .000$.

In step one of Analysis 3, TLX approached the Bonferroni adjusted level of significance for coordination ($R^2 = .10, p = .015$). Physical workload was a significant predictor ($\beta = -.36, p = .000$). Teams reporting greater physical workload demonstrated less coordination. Experimental condition entered in step two of Analysis 3 explained a significant amount of additional variance in coordination ($\Delta R^2 = .11, p \leq .011$). Dummy code 2 was significant ($\beta = .32$, p = .000). Single culture American teams were better coordinated than single culture Chinese teams. The final equation was significant, $F(8, 140) = 4.75, p = .000$.

Decision Making

In step one of Analysis 1, the amount of variance explained by and the beta weight for EFT approached the Bonferroni corrected level of significance for decision making (R^2 = .04, p = .021; β = -.19, p = .021; see Table 66). Teams that were more field independent made more decisions. In step two of Analysis 1, experimental condition explained significant unique variance in decision making (ΔR^2 = .12, $p \leq$ .011). Dummy code 2 was a significant predictor (β = .30, p = .000. Single culture American teams demonstrated more decision making than single culture Chinese teams. The final equation was significant, F (3, 145) = 8.59, p = .000.

In step one of Analysis 2, SMM did not explain significant variance in decision making (R^2 = .02, *n.s.*). Step two of Analysis 2 shows that experimental condition explained additional variance in decision making (ΔR^2 = .10, $p \leq$ .011). Dummy code 2 was significant (β = .28, p = .001). Single culture American teams made more decisions than single culture Chinese teams. The final equation was significant, F (3, 142), = 6.37, p = .000.

In step one of Analysis 3, TLX approached the Bonferroni adjusted significance level (R^2 = .10, p = .021). Physical workload predicted decision making (β = -.32, p = .002). Teams reporting greater physical workload made fewer decisions. Experimental condition entered in step two of Analysis 3 explained a significant amount of additional variance in decision making (ΔR^2 = .06, $p \leq$ .011). Dummy code 2 was significant (β = .23, p = .007). Single culture American teams demonstrated more decision making than single culture Chinese teams. The final equation was significant, F (8, 140) = 3.31, p = .002.

Feedback

In Analysis 1, neither EFT (R^2= .00, *n.s.*; see Table 67) nor experimental condition (ΔR^2 = .01, *n.s.*) explained significant variance in feedback. The final equation was not significant, F (3, 145) = .42, p = .737.

In Analysis 2, neither SMM (R^2 = .00, *n.s.*) nor experimental condition (ΔR^2 = .01, *n.s.*) explained a significant portion of variance in feedback. The final equation was not significant, F (3, 142) = .43, p = .735

In Analysis 3, neither TLX (R^2 = .04, *n.s.*) nor experimental condition (ΔR^2 = .00, *n.s.*) explained significant variance in feedback. The final equation was not significant, F (8, 140) = .79, p = .617.

Monitoring

In Analysis 1, neither EFT (R^2 = .02, *n.s.*; see Table 68) nor experimental condition (ΔR^2 = .00, *n.s.*) explained significant variance in monitoring. The final equation was not significant, F (3, 145) = .89, p = .449.

In Analysis 2, neither SMM (R^2 = .02, *n.s.*) nor experimental condition (ΔR^2 = .00, *n.s.*) explained a significant portion of variance in monitoring. The final equation was not significant, F (3, 142) = 1.20, p = .311.

In Analysis 3, neither TLX ($R^2 = .02$, *n.s.*) nor experimental condition ($\Delta R^2 = .00$, *n.s.*) explained significant variance in monitoring. The final equation was not significant, F (8, 140) = .36, $p = .942$.

Situational Awareness

Step one of Analysis 1 shows that EFT did not explain significant variance in situational awareness ($R^2 = .00$, *n.s.*; see Table 69). In step two of Analysis 1, experimental condition explained significantly more variance in situational awareness ($\Delta R^2 = .12, p \leq .011$). Dummy code 2 was significant ($\beta = .35, p = .000$). Single culture American teams demonstrated more situational awareness than single culture Chinese teams. The overall equation was significant, F (3, 145) = 6.77, $p = .001$.

In step one of Analysis 2, the regression coefficient for SMM was significant ($\beta = .21$, $p = .010$) and the amount of total variance explained was significant ($R^2 = .05, p \leq .011$). Teams that had a better shared mental model of the task demonstrated more situational awareness. In step two of Analysis 2, experimental condition explained additional variance in situational awareness ($\Delta R^2 = .10, p \leq .011$). The regression coefficient for dummy code 2 was significant ($\beta = .32, p = .000$). Single culture American teams demonstrated more situational awareness after controlling for SMM than single culture Chinese teams. The final equation was significant, F (3, 142), = 8.04, $p = .000$.

Step one of Analysis 3 shows that TLX explained significant variance in situational awareness ($R^2 = .12, p \leq .011$). Physical workload predicted situational awareness ($\beta = -.35$, $p = .000$). Teams reporting greater physical workload demonstrated less situational awareness. Experimental condition entered in step two of Analysis 3 explained significant unique variance in situational awareness ($\Delta R^2 = .06, p \leq .011$). The regression coefficient for dummy code 2 was significant ($\beta = .27$, p = .002). Single culture American teams demonstrated more situational awareness after controlling for task load than single culture Chinese teams. The final equation was significant, F (8, 140) = 3.74, $p = .001$.

Team Leadership

In step one of Analysis 1, the amount of variance explained by EFT ($R^2 = .04, p = .017$; see Table 70) and the regression coefficient for EFT ($\beta = -.20$, p = .017) approached the Bonferroni adjusted level of significance for leadership. Teams that were more field independent demonstrated more team leadership. In step two of Analysis 1, experimental condition did not explain significant variance in team leadership ($\Delta R^2 = .00$, *n.s.*). The final equation was not significant, F (3, 145) = 1.91, $p = .131$.

Analysis 2 shows that neither SMM ($R^2 = .03$, *n.s.*) nor experimental condition ($\Delta R^2 = .00$, *n.s.*) explained significant variance in team leadership. The final equation was not significant, F (3, 142), = 1.50, $p = .217$.

In Analysis 3, neither TLX ($R^2 = .03$, *n.s.*) nor experimental condition ($\Delta R^2 = .00$, *n.s.*) explained significant variance in team leadership. The final equation was not significant, F (8, 140) = .66, $p = .729$.

Communication Errors

In step one of Analysis 1, EFT did not explain significant variance in communication errors ($R^2 = .01$, *n.s.*; see Table 71). In step two, experimental condition explained significantly more variance in communication errors ($\Delta R^2 = .13, p \leq .011$). The beta weight for dummy code 1 approached the Bonferroni adjusted level of significance ($\beta = .18, p = .020$). Mixed culture teams made more communication errors than single culture teams. Dummy code 2 was a significant predictor of communication errors ($\beta = -.31, p = .000$). Single culture American teams made fewer communication errors than single culture Chinese teams. The final equation was significant, $F(3, 145) = 8.06, p = .000$.

In step one of Analysis 2, SMM did not explain significant variance in communication errors ($R^2 = .01$, *n.s.*; see Table 71). In step two of Analysis 2, experimental condition explained significant unique variance in communication errors ($\Delta R^2 = .11, p \leq .011$). Dummy code 2 was significant ($\beta = -.29, p = .000$). Single culture American teams made fewer communication errors than single culture Chinese teams. The final equation was significant, $F(3, 142) = 6.47, p = .000$.

In step one of Analysis 3, TLX did not explain a significant portion of variance in communication errors ($R^2 = .08$, *n.s.*). The regression coefficient for physical workload nearly reached the Bonferroni adjusted significance level ($\beta = .25$, p = .017). Teams reporting greater physical workload made more communication errors. In step two of Analysis 3, experimental condition explained additional variance in communication errors ($\Delta R^2 = .08, p \leq .011$). The regression coefficient for dummy code 2 was significant ($\beta = -.25$, p = .003). Single culture American teams made fewer communication errors than single culture Chinese teams. The final equation was significant, $F(8, 140) = 3.26, p = .002$.

Non-Compliance Errors

In Analysis 1, neither EFT ($R^2 = .00$, *n.s.*; see Table 72) nor experimental condition ($\Delta R^2 = .02$, *n.s.*) explained significant variance in non-compliance errors. The final equation was not significant, $F(3, 145) = .78, p = .508$.

In Analysis 2, neither SMM ($R^2 = .00$, *n.s.*) nor experimental condition ($\Delta R^2 = .02$, *n.s.*) explained a significant portion of variance in non-compliance errors. The final equation was not significant, $F(3, 142) = .70, p = .554$.

In Analysis 3, neither TLX ($R^2 = .04$, *n.s.*) nor experimental condition ($\Delta R^2 = .01$, *n.s.*) explained significant variance in non-compliance errors. The overall equation was not significant, $F(8, 140) = .75, p = .648$.

Operational Decision Errors

In step one of Analysis 1, EFT did not explain significant variance in operational decision errors ($R^2 = .00$, *n.s.*; see Table 73). In step two of Analysis 1, experimental condition did not explain significant unique variance in operational decision errors ($\Delta R^2 = .01$, *n.s.*). The final equation was not significant, $F(3, 145) = .71, p = .550$.

In step one of Analysis 2, SMM did not explain a significant portion of variance in operational decision errors ($R^2 = .00$, *n.s.*). In step two of Analysis 2, experimental condition did not explain unique variance in operational decision errors ($\Delta R^2 = .01$, *n.s.*). The final equation was not significant, F (3, 142) = .63, p = .597.

In step one of Analysis 3, TLX did not explain significant variance in operational decision errors ($R^2 = .02$, *n.s.*). In step two of Analysis 2, experimental condition did not explain significant unique variance in operational decision errors ($\Delta R^2 = .01$, *n.s.*). The final equation was not significant, F (8, 140) = .49, p = .866.

Proficiency Errors

In step one of Analysis 1, EFT did not explain significant variance in proficiency errors ($R^2 = .00$, *n.s.*; see Table 74). In step two of Analysis 1, experimental condition did not explain unique variance in proficiency errors ($\Delta R^2 = .01$, *n.s.*). The final equation was not significant, F (3,145) = .55, p = .648.

In step one of Analysis 2, SMM did not explain variance in proficiency errors ($R^2 = .00$, *n.s.*). In step two of Analysis 2, experimental condition did not explain unique variance in proficiency errors ($\Delta R^2 = .01$, *n.s.*). The final equation was not significant, F (3, 142) = .60, p = .616.

In step one of Analysis 3, TLX did not explain a significant portion of variance in proficiency errors ($R^2 = .02$, *n.s*). In step two of Analysis 3, experimental condition did not explain additional variance in proficiency errors ($\Delta R^2 = .01$, *n.s.*). The final equation was not significant, F (8, 140) = .54, p = .826.

Table 59. *I → I Correlations Between EFT Score and Team and Error Behaviors*

Variable	1	2	3	4	5	6	7	8	9
1. Experimental Condition Dummy Code 1	--								
2. Experimental Condition Dummy Code 2	.02	--							
3. Experimental Condition Dummy Code 3	-.01	.00	--						
4. EFT	.06	.14	-.07	--					
5. Assertiveness	.22**	.07	.13	-.17*	--				
6. Decision Making	.09	.17*	.22**	-.14*	.54**	--			
7. Situational Awareness	.00	.13	.38**	-.07	.43**	.44**	--		
8. Team Leadership	-.02	-.13	.30**	-.15*	.28**	.22**	.45**	--	
9. Communication	.35**	.17*	.08	-.06	.76**	.52**	.21**	.11	--
10. Monitoring	-.11	.00	.11	-.08	.33**	.19**	.33**	.54**	.14*
11. Feedback	-.03	.09	-.01	-.06	.05	.00	.05	.01	.04
12. Backup	-.08	-.21**	.09	-.03	.08	.10	.25**	.41**	.01
13. Coordination	.08	.44**	.15*	.00	.25**	.32**	.27**	.02	.26**
14. Non-Compliance Errors	-.06	-.09	-.09	.03	-.12	-.16*	-.03	.19**	-.20**
15. Communication Errors	.02	-.26**	-.23**	.12	-.14	-.17*	-.13	.07	-.18*
16. Proficiency Errors	.06	-.07	-.08	.00	-.01	-.03	.20**	-.06	-.07
17. Operational Decision Errors	.02	-.19**	.02	.00	-.05	-.08	.19**	.19**	-.18*

(Table 59 continues)

Note. N = 196. Team and error behaviors are reported as means for participants who completed two scenarios. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese and mixed culture conditions, -1 = Single culture American and mixed culture conditions, 1= Single culture American condition, and 1 = Single culture Chinese condition. Experimental condition dummy code 2 coded as follows: 0 = Single culture American and mixed culture conditions, 0 = Single culture Chinese and mixed culture conditions, -1 = Single culture Chinese condition, and 1 = Single culture American condition. Experimental condition dummy code 3 coded as follows: 0 = Single culture American condition, 0 = Single culture Chinese condition, -1 = Single culture Chinese and mixed culture conditions, and 1 = Single culture American and mixed culture conditions. * $p \leq .05$. ** $p \leq .01$.

(Table 59 Continued)

Variable	10	11	12	13	14	15	16	17
1. Experimental Condition Dummy Code 1								
2. Experimental Condition Dummy Code 2								
3. Experimental Condition Dummy Code 3								
4. EFT								
5. Assertiveness								
6. Decision Making								
7. Situational Awareness								
8. Team Leadership								
9. Communication								
10. Monitoring	--							
11. Feedback	-.03	--						
12. Backup	.31**	-.08	--					
13. Coordination	.11	.29**	.05	--				
14. Non-Compliance Errors	.19**	-.02	.02	-.15*	--			
15. Communication Errors	.08	-.09	.01	-.35**	.33**	--		
16. Proficiency Errors	-.22**	.06	.02	.02	-.06	.00	--	
17. Operational Decision Errors	.02	-.05	.13	-.18**	.16*	.30**	.44**	--

Note. N = 196. Team and error behaviors are reported as means for participants who completed two scenarios. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese and mixed culture conditions, -1 = Single culture American and mixed culture conditions, 1= Single culture American condition, and 1 = Single culture Chinese condition. Experimental condition dummy code 2 coded as follows: 0 = Single culture American and mixed culture conditions, 0 = Single culture Chinese and mixed culture conditions, -1 = Single culture Chinese condition, and 1 = Single culture American condition. Experimental condition dummy code 3 coded as follows: 0 = Single culture American condition, 0 = Single culture Chinese condition, -1 = Single culture Chinese and mixed culture conditions, and 1 = Single culture American and mixed culture conditions. * $p \leq .05$. ** $p \leq .01$.

Table 60. *I → I Correlations Between TLX Scores and Team and Error Behaviors*

Variable	1	2	3	4	5	6	7
1. Experimental Condition Dummy Code 1	--						
2. Experimental Condition Dummy Code 2	-.01	--					
3. TLX Mental Workload	-.10	-.04	--				
4. TLX Physical Workload	-.03	-.25**	.41**	--			
5. TLX Temporal Workload	-.05	-.11	.54**	.37**	--		
6. TLX Performance	-.06	.14*	.04	-.05	-.08	--	
7. TLX Effort	-.07	-.09	.62**	.52**	.58**	-.02	--
8. TLX Frustration	-.05	-.09	.25**	.22**	.36**	-.09	.35**
9. Assertiveness	-.12*	.13*	.00	-.20**	-.01	.16**	.07
10. Decision Making	-.13*	.24**	-.04	-.19**	-.01	.09	-.02
11. Situational Awareness	-.02	.28**	-.06	-.24**	-.01	.03	-.08
12. Team Leadership	.02	-.01	-.10	-.24**	-.09	.05	-.18**
13. Communication	-.18**	.14*	.02	-.09	.01	.18**	.08
14. Monitoring	.03	.00	-.05	-.24**	-.01	-.01	-.09
15. Feedback	-.07	.02	.07	-.03	-.04	-.06	-.02
16. Backup	-.04	-.13*	.12*	.00	.11	.07	.03
17. Coordination	-.18**	.37**	.08	-.13*	.05	.04	.03
18. Non-Compliance Errors	.01	-.07	-.03	-.07	.03	-.03	-.05
19. Communication Errors	.12*	-.21**	.01	.02	.02	-.12*	-.01
20. Proficiency Errors	-.04	-.05	.08	.14*	.07	-.10	.08
21. Operational Decision Errors	-.01	-.10	.03	.02	.06	-.01	.00

(Table 60 continues)

Note. N = 298. Each scenario was analyzed as a unique case. Each TLX score corresponds to one experimental session. TLX scores and team and error behaviors reported here are unique observations, not aggregated means. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese teams, -1 = Single culture American teams, and 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, and 1 = Single culture American teams. * $p \leq .05$. ** $p \leq .01$.

(Table 60 Continued)

Variable	8	9	10	11	12	13	14
1. Experimental Condition Dummy Code 1							
2. Experimental Condition Dummy Code 2							
3. TLX Mental Workload							
4. TLX Physical Workload							
5. TLX Temporal Workload							
6. TLX Performance							
7. TLX Effort							
8. TLX Frustration	--						
9. Assertiveness	.01	--					
10. Decision Making	.01	.49**	--				
11. Situational Awareness	-.07	.41**	.38**	--			
12. Team Leadership	-.09	.27**	.26**	.41**	--		
13. Communication	.02	.69**	.47**	.17**	.09	--	
14. Monitoring	-.04	.29**	.17**	.23**	.60**	.07	--
15. Feedback	.06	.05	.05	.09	.10	.08	.02
16. Backup	.06	.12*	.19**	.20**	.36**	.06	.36**
17. Coordination	-.05	.26**	.33**	.35**	.11	.25**	.11
18. Non-Compliance Errors	-.03	-.09	-.06	.03	.27**	-.16**	.34**
19. Communication Errors	.00	-.13*	-.14*	-.10	.09	-.16**	.14*
20. Proficiency Errors	.06	-.02	-.07	.19**	-.10	-.11*	-.25**
21. Operational Decision Errors	-.07	-.07	-.07	.13*	.10	-.17**	.01

(Table 60 continues)

Note. N = 298. Each scenario was analyzed as a unique case. Each TLX score corresponds to one experimental session. TLX scores and team and error behaviors reported here are unique observations, not aggregated means. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese teams, -1 = Single culture American teams, and 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, and 1 = Single culture American teams. * $p \leq .05$. ** $p \leq .01$.

(Table 60 Continued)

Variable	15	16	17	18	19	20	21
1. Experimental Condition Dummy Code 1							
2. Experimental Condition Dummy Code 2							
3. TLX Mental Workload							
4. TLX Physical Workload							
5. TLX Temporal Workload							
6. TLX Performance							
7. TLX Effort							
8. TLX Frustration							
9. Assertiveness							
10. Decision Making							
11. Situational Awareness							
12. Team Leadership							
13. Communication							
14. Monitoring							
15. Feedback	--						
16. Backup	.01	--					
17. Coordination	.23**	.06	--				
18. Non-Compliance Errors	.04	.07	-.06	--			
19. Communication Errors	-.12*	.01	-.27**	.33**	--		
20. Proficiency Errors	.05	-.12*	.01	-.14*	-.03	--	
21. Operational Decision Errors	.00	.01	-.18**	.05	.19**	.42**	--

Note. N = 298. Each scenario was analyzed as a unique case. Each TLX score corresponds to one experimental session. TLX scores and team and error behaviors reported here are unique observations, not aggregated means. Experimental condition dummy code 1 coded as follows: -1 = Single culture Chinese teams, -1 = Single culture American teams, and 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, and 1 = Single culture American teams. * $p \leq .05$. ** $p \leq .01$.

Table 61. *T → T Correlations Between Cognition (EFT, SMM, and TLX) and Team and Error Behaviors*

Variable	1	2	3	4	5	6	7	8
1. Experimental Condition Dummy Code 1	--							
2. Experimental Condition Dummy Code 2	-.01	--						
3. EFT	-.05	.06	--					
4. Shared Mental Model	.04	.11	-.01	--				
5. TLX Mental Workload	-.12	-.06	.05	-.02	--			
6. TLX Physical Workload	-.04	-.35**	-.04	-.07	.51**	--		
7. TLX Temporal Workload	-.08	-.14	.10	.04	.58**	.47**	--	
8. TLX Performance	-.08	.18*	-.07	.03	.13	.00	-.05	--
9. TLX Effort	-.09	-.11	.01	-.04	.70**	.56**	.61**	.05
10. TLX Frustration	-.08	-.12	.11	-.17*	.37**	.37**	.40**	-.04
11. Assertiveness	-.14	.14	-.24**	.15	.04	-.15	.02	.22**
12. Decision Making	-.15	.29**	-.19*	.13	.07	-.14	.07	.15
13. Situational Awareness	-.03	.34**	-.05	.21**	.00	-.24**	.00	.11
14. Team Leadership	.02	-.01	-.19*	.17*	-.09	-.12	-.05	.00
15. Communication	-.20*	.14	-.16*	.09	.04	-.05	.00	.26**
16. Monitoring	.04	.00	-.13	.15	.01	-.01	.06	-.07
17. Feedback	-.07	.03	-.05	.05	.07	-.06	-.02	-.04
18. Backup	-.06	-.16	-.05	.08	.21*	.25**	.20*	.08
19. Coordination	-.18*	.37**	-.04	.29**	.08	-.21*	.04	.04
20. Non-Compliance Errors	.02	-.12	.02	-.01	.02	.10	.02	-.07
21. Communication Errors	.18*	-.30**	.12	-.10	.05	.17*	.04	-.16*
22. Proficiency Errors	-.07	-.07	.03	.04	.04	.01	.11	-.09
23. Operational Decision Errors	-.02	-.11	.03	-.01	.04	.03	.08	-.05

(Table 61 continues)

Note. N = 149. EFT, TLX, and team/error behaviors are means of pilot and copilot scores. SMM values are represented as proximities (using the correlation function) between pilot and copilot evaluations of task relatedness statements. Experimental dummy code 1 coded as follows: -1 = Single culture Chinese teams, -1 = Single culture American teams, 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, 1 = Single culture American teams. * $p \leq .05$. ** $p \leq .01$.

(Table 61 Continued)

Variable	9	10	11	12	13	14	15	16
1. Experimental Condition Dummy Code 1								
2. Experimental Condition Dummy Code 2								
3. EFT								
4. Shared Mental Model (SMM)								
5. TLX Mental Workload								
6. TLX Physical Workload								
7. TLX Temporal Workload								
8. TLX Performance								
9. TLX Effort	--							
10. TLX Frustration	.35**	--						
11. Assertiveness	.15	.01	--					
12. Decision Making	.11	.02	.55**	--				
13. Situational Awareness	.01	-.15	.42**	.33**	--			
14. Team Leadership	-.13	-.13	.27**	.17*	.44**	--		
15. Communication	.14	.01	.78**	.51**	.14	.07	--	
16. Monitoring	.08	.01	.29**	.14	.29**	.54**	.04	--
17. Feedback	-.02	.09	.03	.08	.09	.25**	.07	.12
18. Backup	.15	.13	.04	.11	.15	.17*	.03	.17*
19. Coordination	.03	-.08	.29**	.41**	.40**	.15	.26**	.17*
20. Non-Compliance Errors	-.01	-.08	-.17*	-.15	.15	.12	-.28**	.09
21. Communication Errors	.00	.00	-.17*	-.24**	.03	.09	-.22**	.01
22. Proficiency Errors	.05	.05	.05	.03	.34**	.45**	-.13	.31**
23. Operational Decision Errors	.01	-.03	-.12	-.08	.20*	.34**	-.20*	.21*

(Table 61 continues)

Note. N = 149. EFT, TLX, and team/error behaviors are means of pilot and copilot scores. SMM values are represented as proximities (using the correlation function) between pilot and copilot evaluations of task relatedness statements. Experimental dummy code 1 coded as follows: -1 = Single culture Chinese teams, -1 = Single culture American teams, 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, 1 = Single culture American teams. * $p \leq .05$. ** $p \leq .01$.

(Table 61 Continued)

Variable	17	18	19	20	21	22	23
1. Experimental Condition Dummy Code 1							
2. Experimental Condition Dummy Code 2							
3. EFT							
4. Shared Mental Model							
5. TLX Mental Workload							
6. TLX Physical Workload							
7. TLX Temporal Workload							
8. TLX Performance							
9. TLX Effort							
10. TLX Frustration							
11. Assertiveness							
12. Decision Making							
13. Situational Awareness							
14. Team Leadership							
15. Communication							
16. Monitoring							
17. Feedback	--						
18. Backup	.06	--					
19. Coordination	.26**	.06	--				
20. Non-Compliance Errors	.08	.00	-.10	--			
21. Communication Errors	-.09	.01	-.38**	.21*	--		
22. Proficiency Errors	.00	.03	.01	.37**	.33**	--	
23. Operational Decision Errors	.00	.04	-.18*	.36**	.43**	.56**	--

Note. N = 149. EFT, TLX, and team/error behaviors are means of pilot and copilot scores. SMM values are represented as proximities (using the correlation function) between pilot and copilot evaluations of task relatedness statements. Experimental dummy code 1 coded as follows: -1 = Single culture Chinese teams, -1 = Single culture American teams, 2 = Mixed culture teams. Experimental condition dummy code 2 coded as follows: 0 = Mixed culture teams, -1 = Single culture Chinese teams, 1 = Single culture American teams. * $p \leq .05$. ** $p \leq .01$.

Table 62. *Multiple Regression Results for Cognition and Experimental Condition Predicting Assertiveness at Individual and Team Levels of Analysis*

	Measure	I→I				T→T			
		B	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – EFT								
Step 1	I→I: $R^2 = .03^{\dagger}$								
	T→T: $R^2 = .06^{*}$								
	EFT	-.10	.04	-.18	.015†	-.17	.06	-.24	.003*
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .08^{*}$								
	T→T: $\Delta R^2 = .05^{\dagger}$								
	Experimental Condition[a] (Dummy Code 1)	2.17	.67	.23	.001*	-.87	.44	-.15	.052
	Experimental Condition[b] (Dummy Code 2)	1.32	.96	.10	.174	1.56	.79	.16	.051
	Experimental Condition[c] (Dummy Code 3)	1.53	.90	.12	.091	N/A	N/A	N/A	N/A
	Analysis 2 – SMM								
Step 1	T→T: $R^2 = .02$								
	SMM	N/A	N/A	N/A	N/A	5.93	3.22	.15	.067
Step 2	Experimental Condition Variables								
	T→T: $\Delta R^2 = .04$								
	Experimental Condition[a] (Dummy Code 1)	N/A	N/A	N/A	N/A	-.85	.46	-.15	.066
	Experimental Condition[b] (Dummy Code 2)	N/A	N/A	N/A	N/A	1.31	.84	.13	.120

(Table 62 continues)

(Table 62 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Analysis 3 – TLX								
Step 1	I→I: $R^2 = .10$*								
	T→T: $R^2 = .15$*								
	Effort	.10	.03	.25	.002*	.18	.06	.38	.002*
	Frustration	.01	.02	.02	.710	.02	.04	.05	.585
	Mental Workload	-.02	.04	-.05	.515	-.06	.06	-.11	.344
	Performance	.06	.02	.16	.005*	.09	.03	.22	.006*
	Physical Workload	-.10	.02	-.30	.000*	-.13	.04	-.32	.002*
	Temporal Workload	.00	.03	-.01	.939	-.01	.05	-.01	.922
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .01$								
	T→T: $\Delta R^2 = .02$								
	Experimental Condition[a] (Dummy Code 1)	-.69	.37	-.11	.061	-.67	.44	-.12	.132
	Experimental Condition[b] (Dummy Code 2)	.59	.67	.05	.379	.41	.86	.04	.629

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 63. *Multiple Regression Results for Cognition and Experimental Condition Predicting Backup at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – EFT								
Step 1	I→I: R^2 = .00								
	T→T: R^2 = .00								
	EFT	.00	.01	-.03	.667	-.01	.02	-.05	.548
Step 2	Experimental Condition Variables								
	I→I: ΔR^2 = .06*								
	T→T: ΔR^2 = .03								
	Experimental Condition[a] (Dummy Code 1)	-.18	.17	-.08	.268	-.10	.13	-.06	.447
	Experimental Condition[b] (Dummy Code 2)	-.71	.24	-.21	.004*	-.44	.23	-.16	.055
	Experimental Condition[c] (Dummy Code 3)	.28	.23	.09	.216	N/A	N/A	N/A	N/A
	Analysis 2 – SMM								
Step 1	T→T: R^2 = .01								
	SMM	N/A	N/A	N/A	N/A	.88	.90	.08	.325
Step 2	Experimental Condition Variables								
	T→T: ΔR^2 = .03								
	Experimental Condition[a] (Dummy Code 1)	N/A	N/A	N/A	N/A	-.09	.13	-.06	.474
	Experimental Condition[b] (Dummy Code 2)	N/A	N/A	N/A	N/A	-.48	.23	-.17	.044

(Table 63 continues)

(Table 63 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Analysis 3 – TLX								
Step 1	I→I: $R^2 = .03$								
	T→T: $R^2 = .09$								
	Effort	-.01	.01	-.11	.185	-.02	.02	-.12	.340
	Frustration	.01	.01	.05	.480	.00	.01	.01	.901
	Mental Workload	.02	.01	.15	.057	.02	.02	.11	.378
	Performance	.01	.01	.06	.298	.01	.01	.08	.363
	Physical Workload	.00	.01	-.04	.539	.02	.01	.20	.049
	Temporal Workload	.01	.01	.09	.218	.02	.02	.12	.268
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .02$								
	T→T: $\Delta R^2 = .01$								
	Experimental Condition[a] (Dummy Code 1)	-.05	.12	-.03	.661	-.05	.13	-.03	.687
	Experimental Condition[b] (Dummy Code 2)	-.53	.22	-.15	.016[†]	-.31	.25	-.11	.209

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

[†] Denotes result approaching significance. Refer to text for further discussion.

Table 64. *Multiple Regression Results for Cognition and Experimental Condition Predicting Communication at Individual and Team Levels of Analysis*

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Analysis 1 – EFT								
Step 1	I→I: R^2 = .00 T→T: R^2 = .03								
	EFT	.05	.06	-.06	.413	-.18	.09	-.16	.048
Step 2	Experimental Condition Variables I→I: ΔR^2 = .16* T→T: ΔR^2 = .07*								
	Experimental Condition[a] (Dummy Code 1)	4.82	.93	.35	.000*	-.1.76	.68	-.20	.011*
	Experimental Condition[b] (Dummy Code 2)	3.53	1.36	.18	.010*	2.35	1.22	.15	.057
	Experimental Condition[c] (Dummy Code 3)	1.39	1.27	.07	.273	N/A	N/A	N/A	N/A
	Analysis 2 – SMM								
Step 1	T→T: R^2 = .01								
	SMM	N/A	N/A	N/A	N/A	5.36	4.94	.09	.280
Step 2	Experimental Condition Variables T→T: ΔR^2 = .07*								
	Experimental Condition[a] (Dummy Code 1)	N/A	N/A	N/A	N/A	-1.80	.70	-.21	.011*
	Experimental Condition[b] (Dummy Code 2)	N/A	N/A	N/A	N/A	2.33	1.27	.15	.069

(Table 64 continues)

(Table 64 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Analysis 3 – TLX								
Step 1	I→I: $R^2 = .06$*								
	T→T: $R^2 = .12$*								
	Effort	.11	.05	.19	.026	.24	.09	.33	.009*
	Frustration	.01	.04	.02	.705	.03	.06	.04	.693
	Mental Workload	-.02	.05	-.03	.704	-.10	.10	-.12	.320
	Performance	.09	.03	.18	.002*	.16	.05	.26	.002*
	Physical Workload	-.07	.03	-.16	.018†	-.11	.06	-.17	.095
	Temporal Workload	-.01	.05	-.02	.749	-.04	.08	-.05	.623
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .04$*								
	T→T: $\Delta R^2 = .04$								
	Experimental Condition[a] (Dummy Code 1)	-1.53	.52	-.17	.004*	-1.50	.68	-.17	.028
	Experimental Condition[b] (Dummy Code 2)	1.59	.96	.10	.097	1.24	1.31	.08	.347

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 65. *Multiple Regression Results for Cognition and Experimental Condition Predicting Coordination at Individual and Team Levels of Analysis*

	Measure	I→I				T→T			
		B	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – EFT								
Step 1	I→I: R^2 = .00 T→T: R^2 = .00								
	EFT	.00	.00	.02	.810	.00	.01	-.04	.626
Step 2	Experimental Condition Variables I→I: ΔR^2 = .22* T→T: ΔR^2 = .17*								
	Experimental Condition[a] (Dummy Code 1)	.06	.05	.08	.236	-.11	.05	-.18	.019[†]
	Experimental Condition[b] (Dummy Code 2)	.50	.08	.44	.000*	.42	.09	.37	.000*
	Experimental Condition[c] (Dummy Code 3)	.16	.07	.15	.025	N/A	N/A	N/A	N/A
	Analysis 2 – SMM								
Step 1	T→T: R^2 = .08*								
	SMM	N/A	N/A	N/A	N/A	1.23	.34	.29	.000*
Step 2	Experimental Condition Variables T→T: ΔR^2 = .15*								
	Experimental Condition[a] (Dummy Code 1)	N/A	N/A	N/A	N/A	-.11	.05	-.18	.017[†]
	Experimental Condition[b] (Dummy Code 2)	N/A	N/A	N/A	N/A	.39	.08	.34	.000*

(Table 65 continues)

(Table 65 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Analysis 3 – TLX								
Step 1	I→I: $R^2 = .05$ T→T: $R^2 = .10^{\dagger}$								
	Effort	.00	.00	.06	.488	.00	.01	.07	.563
	Frustration	.00	.00	-.07	.242	.00	.01	-.08	.396
	Mental Workload	.01	.00	.12	.113	.01	.01	.19	.123
	Performance	.00	.00	.02	.768	.00	.00	.02	.809
	Physical Workload	-.01	.00	-.22	.001*	-.02	.01	-.36	.000*
	Temporal Workload	.00	.00	.05	.504	.01	.01	.09	.397
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .14$* T→T: $\Delta R^2 = .11$*								
	Experimental Condition[a] (Dummy Code 1)	-.11	.04	-.16	.003*	-.11	.05	-.17	.030
	Experimental Condition[b] (Dummy Code 2)	.39	.06	.34	.000*	.36	.09	.32	.000*

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

[†] Denotes result approaching significance. Refer to text for further discussion.

Table 66. *Multiple Regression Results for Cognition and Experimental Condition Predicting Decision Making at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – EFT								
Step 1	I→I: R^2 = .02 T→T: R^2 = .04†								
	EFT	-.01	.01	-.14	.049	-.03	.01	-.19	.021†
Step 2	Experimental Condition Variables I→I: ΔR^2 = .09* T→T: ΔR^2 = .12*								
	Experimental Condition[a] (Dummy Code 1)	.18	.12	.10	.153	-.17	.08	-.16	.038
	Experimental Condition[b] (Dummy Code 2)	.48	.18	.19	.007*	.57	.15	.30	.000*
	Experimental Condition[c] (Dummy Code 3)	.50	.17	.21	.003*	N/A	N/A	N/A	N/A
	Analysis 2 – SMM								
Step 1	T→T: R^2 = .02								
	SMM	N/A	N/A	N/A	N/A	.96	.61	.13	.118
Step 2	Experimental Condition Variables T→T: ΔR^2 = .10*								
	Experimental Condition[a] (Dummy Code 1)	N/A	N/A	N/A	N/A	-.17	.09	-.16	.051
	Experimental Condition[b] (Dummy Code 2)	N/A	N/A	N/A	N/A	.54	.15	.28	.001*

(Table 66 continues)

(Table 66 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Analysis 3 – TLX								
Step 1	I→I: $R^2 = .05^{\dagger}$								
	T→T: $R^2 = .10^{\dagger}$								
	Effort	.01	.01	.09	.282	.02	.01	.22	.073
	Frustration	.00	.01	.03	.660	.00	.01	.04	.679
	Mental Workload	.00	.01	-.04	.590	.00	.01	.01	.959
	Performance	.01	.00	.10	.097	.01	.01	.14	.086
	Physical Workload	-.02	.01	-.23	.001*	-.02	.01	-.32	.002*
	Temporal Workload	.00	.01	.05	.521	.01	.01	.07	.514
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .05$*								
	T→T: $\Delta R^2 = .06$*								
	Experimental Condition[a] (Dummy Code 1)	-.15	.08	-.11	.046	-.14	.08	-.13	.103
	Experimental Condition[b] (Dummy Code 2)	.45	.14	.19	.001*	.44	.16	.23	.007*

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.
[a] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).
[b] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).
[c] Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.
† Denotes result approaching significance. Refer to text for further discussion.

Table 67. *Multiple Regression Results for Cognition and Experimental Condition Predicting Feedback at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – EFT								
Step 1	I→I: $R^2 = .00$ T→T: $R^2 = .00$								
	EFT	.00	.00	-.05	.489	.00	.01	-.05	.555
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .01$ T→T: $\Delta R^2 = .01$								
	Experimental Condition[a] (Dummy Code 1)	-.02	.05	-.03	.670	-.04	.05	-.07	.374
	Experimental Condition[b] (Dummy Code 2)	.10	.08	.10	.186	.03	.08	.03	.733
	Experimental Condition[c] (Dummy Code 3)	-.02	.07	-.02	.825	N/A	N/A	N/A	N/A
	Analysis 2 – SMM								
Step 1	T→T: $R^2 = .00$								
	SMM	N/A	N/A	N/A	N/A	.20	.30	.06	.513
Step 2	Experimental Condition Variables T→T: $\Delta R^2 = .01$								
	Experimental Condition[a] (Dummy Code 1)	N/A	N/A	N/A	N/A	-.04	.04	-.07	.400
	Experimental Condition[b] (Dummy Code 2)	N/A	N/A	N/A	N/A	.03	.08	.03	.720

(Table 67 continues)

(Table 67 continued)

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Analysis 3 – TLX								
Step 1	I→I: $R^2 = .03$								
	T→T: $R^2 = .04$								
	Effort	.00	.00	-.07	.409	.00	.01	-.09	.492
	Frustration	.00	.00	.09	.169	.01	.00	.12	.208
	Mental Workload	.01	.00	.18	.021†	.01	.01	.21	.091
	Performance	.00	.00	-.08	.167	.00	.00	-.07	.444
	Physical Workload	.00	.00	-.06	.428	.00	.00	-.12	.269
	Temporal Workload	.00	.00	-.13	.101	.00	.01	-.09	.439
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .01$								
	T→T: $\Delta R^2 = .00$								
	Experimental Condition[a] (Dummy Code 1)	-.04	.03	-.07	.255	-.03	.04	-.06	.467
	Experimental Condition[b] (Dummy Code 2)	.02	.06	.02	.726	.00	.08	.00	.993

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.
[a] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).
[b] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).
[c] Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.
† Denotes result approaching significance. Refer to text for further discussion.

Table 68. *Multiple Regression Results for Cognition and Experimental Condition Predicting Monitoring at Individual and Team Levels of Analysis*

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Analysis 1 – EFT								
Step 1	I→I: R^2 = .01 T→T: R^2 = .02								
	EFT	-.01	.01	-.08	.256	-.02	.02	-.13	.114
Step 2	Experimental Condition Variables I→I: ΔR^2 = .02 T→T: ΔR^2 = .00								
	Experimental Condition[a] (Dummy Code 1)	-.26	.18	-.11	.144	.05	.11	.03	.681
	Experimental Condition[b] (Dummy Code 2)	.05	.26	.01	.861	.02	.20	.01	.935
	Experimental Condition[c] (Dummy Code 3)	.36	.24	.11	.136	N/A	N/A	N/A	N/A
	Analysis 2 – SMM								
Step 1	T→T: R^2 = .02								
	SMM	N/A	N/A	N/A	N/A	1.47	.78	.16	.062
Step 2	Experimental Condition Variables T→T: ΔR^2 = .00								
	Experimental Condition[a] (Dummy Code 1)	N/A	N/A	N/A	N/A	.04	.11	.03	.735
	Experimental Condition[b] (Dummy Code 2)	N/A	N/A	N/A	N/A	.00	.21	.00	.991

(Table 68 continues)

(Table 68 continued)

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Analysis 3 – TLX								
Step 1	I→I: $R^2 = .07$*								
	T→T: $R^2 = .02$								
	Effort	.00	.01	-.01	.879	.02	.02	.15	.256
	Frustration	.00	.01	-.01	.844	-.01	.01	-.01	.900
	Mental Workload	.01	.01	.04	.605	-.01	.02	-.06	.630
	Performance	.00	.01	-.02	.733	-.01	.01	-.07	.449
	Physical Workload	-.04	.01	-.28	.000*	-.01	.01	-.08	.449
	Temporal Workload	.01	.01	.08	.301	.01	.01	.04	.723
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .01$								
	T→T: $\Delta R^2 = .00$								
	Experimental Condition[a] (Dummy Code 1)	.07	.14	.03	.645	.06	.12	.48	.631
	Experimental Condition[b] (Dummy Code 2)	-.28	.26	-.07	.280	.23	.00	.01	.990

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

Table 69. *Multiple Regression Results for Cognition and Experimental Condition Predicting Situational Awareness at Individual and Team Levels of Analysis*

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Analysis 1 – EFT								
Step 1	I→I: $R^2 = .01$ T→T: $R^2 = .00$								
	EFT	-.02	.02	-.08	.297	-.02	.03	-.05	.540
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .16$* T→T: $\Delta R^2 = .12$*								
	Experimental Condition[a] (Dummy Code 1)	.04	.32	.01	.897	-.10	.25	-.03	.703
	Experimental Condition[b] (Dummy Code 2)	.97	.47	.14	.043	1.98	.45	.35	.000*
	Experimental Condition[c] (Dummy Code 3)	2.51	.44	.38	.000*	N/A	N/A	N/A	N/A
	Analysis 2 – SMM								
Step 1	T→T: $R^2 = .05$*								
	SMM	N/A	N/A	N/A	N/A	4.57	1.75	.21	.010*
Step 2	Experimental Condition Variables T→T: $\Delta R^2 = .10$*								
	Experimental Condition[a] (Dummy Code 1)	N/A	N/A	N/A	N/A	-.09	.24	-.03	.724
	Experimental Condition[b] (Dummy Code 2)	N/A	N/A	N/A	N/A	1.78	.44	.32	.000*

(Table 69 continues)

(Table 69 continued)

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Analysis 3 – TLX								
Step 1	I→I: $R^2 = .06$*								
	T→T: $R^2 = .12$*								
	Effort	.01	.02	.03	.762	.04	.03	.15	.228
	Frustration	-.01	.02	-.06	.384	-.04	.02	-.13	.147
	Mental Workload	-.01	.02	-.03	.746	.01	.04	.04	.723
	Performance	.01	.01	.03	.621	.02	.02	.10	.212
	Physical Workload	-.05	.01	-.26	.000*	-.08	.02	-.35	.001*
	Temporal Workload	.03	.02	.11	.148	.03	.03	.11	.331
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .05$*								
	T→T: $\Delta R^2 = .06$*								
	Experimental Condition[a] (Dummy Code 1)	-.03	.22	-.01	.881	-.07	.25	-.02	.791
	Experimental Condition[b] (Dummy Code 2)	1.62	.40	.24	.000*	1.52	.48	.27	.002*

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

Table 70. *Multiple Regression Results for Cognition and Experimental Condition Predicting Team Leadership at Individual and Team Levels of Analysis*

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Analysis 1 – EFT								
Step 1	I→I: R^2 = .03†								
	T→T: R^2 = .04†								
	EFT	-.05	.02	-.16	.023†	-.07	.03	-.20	.017†
Step 2	Experimental Condition Variables								
	I→I: ΔR^2 = .10*								
	T→T: ΔR^2 = .00								
	Experimental Condition[a] (Dummy Code 1)	-.05	.35	-.01	.893	.03	.23	.01	.896
	Experimental Condition[b] (Dummy Code 2)	-.87	.52	-.12	.097	.02	.42	.00	.965
	Experimental Condition[c] (Dummy Code 3)	2.05	.49	.30	.000*	N/A	N/A	N/A	N/A
	Analysis 2 – SMM								
Step 1	T→T: R^2 = .03								
	SMM	N/A	N/A	N/A	N/A	3.40	1.61	.17	.036
Step 2	Experimental Condition Variables								
	T→T: ΔR^2 = .00								
	Experimental Condition[a] (Dummy Code 1)	N/A	N/A	N/A	N/A	.06	.23	.02	.797
	Experimental Condition[b] (Dummy Code 2)	N/A	N/A	N/A	N/A	-.05	.43	-.01	.909

(Table 70 continues)

(Table 70 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Analysis 3 – TLX								
Step 1	I→I: $R^2 = .07$*								
	T→T: $R^2 = .03$								
	Effort	-.03	.03	-.11	.200	-.03	.03	-.13	.304
	Frustration	-.01	.02	-.02	.729	-.03	.02	-.11	.236
	Mental Workload	.02	.03	.05	.504	.01	.03	.02	.874
	Performance	.01	.02	.03	.590	.00	.02	.01	.946
	Physical Workload	-.05	.02	-.21	.002*	-.01	.02	-.06	.555
	Temporal Workload	.01	.02	.03	.686	.03	.03	.10	.392
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .01$								
	T→T: $\Delta R^2 = .00$								
	Experimental Condition[a] (Dummy Code 1)	.06	.27	.01	.815	.02	.24	.01	.919
	Experimental Condition[b] (Dummy Code 2)	-.62	.49	-.08	.204	-.26	.46	-.05	.570

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

[†] Denotes result approaching significance. Refer to text for further discussion.

Table 71. *Multiple Regression Results for Cognition and Experimental Condition Predicting Communication Errors at Individual and Team Levels of Analysis*

	Measure	I→I				T→T			
		B	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – EFT								
Step 1	I→I: R^2 = .01 T→T: R^2 = .01 EFT	.01	.01	.11	.120	.01	.01	.12	.151
Step 2	Experimental Condition Variables I→I: ΔR^2 = .12* T→T: ΔR^2 = .13*								
	Experimental Condition[a] (Dummy Code 1)	.01	.11	.01	.905	.17	.07	.18	.020[†]
	Experimental Condition[b] (Dummy Code 2)	-.66	.16	-.28	.000*	-.51	.13	-.31	.000*
	Experimental Condition[c] (Dummy Code 3)	-.48	.15	-.22	.002*	N/A	N/A	N/A	N/A
	Analysis 2 – SMM								
Step 1	T→T: R^2=.01 SMM	N/A	N/A	N/A	N/A	-.61	.53	-.10	.249
Step 2	Experimental Condition Variables T→T: ΔR^2 = .11*								
	Experimental Condition[a] (Dummy Code 1)	N/A	N/A	N/A	N/A	.16	.07	.17	.033
	Experimental Condition[b] (Dummy Code 2)	N/A	N/A	N/A	N/A	-.48	.13	-.29	.000*

(Table 71 continues)

(Table 71 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Analysis 3 – TLX								
Step 1	I→I: $R^2 = .02$								
	T→T: $R^2 = .08$								
	Effort	.00	-.01	-.04	.612	-.01	.01	-.18	.162
	Frustration	.00	.01	-.01	.860	-.01	.01	-.08	.392
	Mental Workload	.00	.01	.02	.785	.01	.01	.11	.379
	Performance	-.01	.00	-.12	.052	-.01	.01	-.17	.039
	Physical Workload	.00	.01	.02	.795	.02	.01	.25	.017†
	Temporal Workload	.00	.01	.02	.829	.00	.01	.00	.975
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .05$*								
	T→T: $\Delta R^2 = .08$*								
	Experimental Condition[a] (Dummy Code 1)	.16	.08	.12	.046	.16	.07	.17	.034
	Experimental Condition[b] (Dummy Code 2)	-.49	.14	-.21	.001*	-.42	.14	-.25	.003*

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .025$.

[a] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

† Denotes result approaching significance. Refer to text for further discussion.

Table 72. *Multiple Regression Results for Cognition and Experimental Condition Predicting Non-Compliance Errors at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – EFT								
Step 1	I→I: $R^2 = .00$ T→T: $R^2 = .00$								
	EFT	.00	.01	.01	.845	.00	.01	.02	.855
Step 2	Experimental Condition Variables I→I: $\Delta R^2 = .02$ T→T: $\Delta R^2 = .02$								
	Experimental Condition[a] (Dummy Code 1)	-.11	.13	-.06	.406	.02	.08	.02	.806
	Experimental Condition[b] (Dummy Code 2)	-.24	.19	-.10	.196	-.21	.14	-.12	.138
	Experimental Condition[c] (Dummy Code 3)	-.22	.18	-.09	.206	N/A	N/A	N/A	N/A
	Analysis 2 – SMM								
Step 1	T→T: $R^2 = .00$								
	SMM	N/A	N/A	N/A	N/A	-.04	.55	-.01	.936
Step 2	Experimental Condition Variables T→T: $\Delta R^2 = .02$								
	Experimental Condition[a] (Dummy Code 1)	N/A	N/A	N/A	N/A	.01	.08	.01	.891
	Experimental Condition[b] (Dummy Code 2)	N/A	N/A	N/A	N/A	-.21	.15	-.12	.152

(Table 72 continues)

(Table 72 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Analysis 3 – TLX								
Step 1	I→I: R^2 = .01								
	T→T: R^2 = .04								
	Effort	.00	.01	-.04	.663	-.01	.01	-.10	.458
	Frustration	.00	.01	-.04	.588	-.01	.01	-.14	.139
	Mental Workload	.00	.01	-.03	.677	.00	.01	.04	.725
	Performance	.00	.01	-.02	.685	-.01	.01	-.08	.346
	Physical Workload	-.01	.01	-.07	.345	.01	.01	.17	.115
	Temporal Workload	.01	.01	.10	.193	.00	.01	.03	.785
Step 2	Experimental Condition Variables								
	I→I: ΔR^2 = .01								
	T→T: ΔR^2 = .01								
	Experimental Condition[a] (Dummy Code 1)	.02	.10	.01	.848	.01	.08	.01	.913
	Experimental Condition[b] (Dummy Code 2)	-.26	.18	-.09	.139	-.14	.16	-.09	.353

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

Table 73. *Multiple Regression Results for Cognition and Experimental Condition Predicting Operational Decision Errors at Individual and Team Levels of Analysis*

	Measure	I→I *B*	I→I *SEB*	I→I *β*	I→I *p*	T→T *B*	T→T *SEB*	T→T *β*	T→T *p*
	Analysis 1 – EFT								
Step 1	I→I: R^2 = .00 T→T: R^2 = .00								
	EFT	.00	.00	.00	.956	.00	.01	.03	.742
Step 2	Experimental Condition Variables I→I: ΔR^2 = .04 T→T: ΔR^2 = .01								
	Experimental Condition[a] (Dummy Code 1)	.01	.06	.02	.809	-.01	.05	-.02	.821
	Experimental Condition[b] (Dummy Code 2)	-.24	.09	-.19	.008*	-.12	.08	-.12	.163
	Experimental Condition[c] (Dummy Code 3)	.02	.08	.02	.802	N/A	N/A	N/A	N/A
	Analysis 2 – SMM								
Step 1	T→T: R^2 = .00								
	SMM	N/A	N/A	N/A	N/A	-.05	.33	-.01	.870
Step 2	Experimental Condition Variables T→T: ΔR^2 = .01								
	Experimental Condition[a] (Dummy Code 1)	N/A	N/A	N/A	N/A	-.02	.05	-.03	.720
	Experimental Condition[b] (Dummy Code 2)	N/A	N/A	N/A	N/A	-.11	.09	-.11	.189

(Table 73 continues)

(Table 73 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Analysis 3 – TLX								
Step 1	I→I: $R^2 = .02$								
	T→T: $R^2 = .02$								
	Effort	.00	.00	-.05	.554	.00	.01	-.08	.519
	Frustration	.00	.00	-.10	.109	.00	.00	-.08	.416
	Mental Workload	.00	.00	.03	.721	.00	.01	.05	.704
	Performance	.00	.00	-.02	.777	.00	.00	-.05	.587
	Physical Workload	.00	.00	.02	.762	.00	.00	.03	.810
	Temporal Workload	.00	.00	.10	.209	.01	.01	.12	.302
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .01$								
	T→T: $\Delta R^2 = .01$								
	Experimental Condition[a] (Dummy Code 1)	-.01	.04	-.01	.870	-.01	.05	-.02	.808
	Experimental Condition[b] (Dummy Code 2)	-.12	.07	-.10	.105	-.12	.09	-.12	.211

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

Table 74. *Multiple Regression Results for Cognition and Experimental Condition Predicting Proficiency Errors at Individual and Team Levels of Analysis*

		I→I				T→T			
	Measure	*B*	*SEB*	*β*	*p*	*B*	*SEB*	*β*	*p*
	Analysis 1 – EFT								
Step 1	I→I: R^2 = .00								
	T→T: R^2 = .00								
	EFT	.00	.01	.00	.973	.01	.02	.03	.758
Step 2	Experimental Condition Variables								
	I→I: ΔR^2 = .02								
	T→T: ΔR^2 = .01								
	Experimental Condition[a] (Dummy Code 1)	.17	.21	.06	.414	-.12	.14	-.07	.388
	Experimental Condition[b] (Dummy Code 2)	-.29	.31	-.07	.361	-.23	.25	-.08	.366
	Experimental Condition[c] (Dummy Code 3)	-.33	.29	-.08	.256	N/A	N/A	N/A	N/A
	Analysis 2 – SMM								
Step 1	T→T: R^2 = .00								
	SMM	N/A	N/A	N/A	N/A	.44	.98	.04	.655
Step 2	Experimental Condition Variables								
	T→T: ΔR^2 = .01								
	Experimental Condition[a] (Dummy Code 1)	N/A	N/A	N/A	N/A	-.13	.14	-.08	.363
	Experimental Condition[b] (Dummy Code 2)	N/A	N/A	N/A	N/A	-.23	.26	-.07	.377

(Table 74 continues)

(Table 74 continued)

	Measure	I→I B	I→I SEB	I→I β	I→I p	T→T B	T→T SEB	T→T β	T→T p
	Analysis 3 – TLX								
Step 1	I→I: $R^2 = .03$								
	T→T: $R^2 = .02$								
	Effort	.00	.01	.00	.991	.00	.02	.01	.966
	Frustration	.00	.01	.01	.849	.00	.01	.02	.843
	Mental Workload	.01	.01	.03	.711	.00	.02	-.01	.948
	Performance	-.01	.01	-.09	.126	-.01	.01	-.08	.339
	Physical Workload	.02	.01	.13	.069	-.01	.01	-.05	.615
	Temporal Workload	.00	.01	-.01	.908	.01	.02	.12	.281
Step 2	Experimental Condition Variables								
	I→I: $\Delta R^2 = .00$								
	T→T: $\Delta R^2 = .01$								
	Experimental Condition[a] (Dummy Code 1)	-.10	-.14	.04	.498	-.12	.14	-.07	.397
	Experimental Condition[b] (Dummy Code 2)	-.02	.26	.00	.944	-.21	.28	-.07	.458

Note: I → I = Individual predicting individual behaviors, T → T = Team predicting team behaviors. Significant results for these analyses were considered * $p \leq .011$.

[a] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (1), single culture American and mixed culture (-1), single culture Chinese and mixed culture (-1); dummy codes used for T → T analysis: mixed culture (2), single culture Chinese (-1), single culture American (-1).

[b] Dummy codes used for I → I analysis: single culture American (1), single culture Chinese (-1), single culture American and mixed culture (0), single culture Chinese and mixed culture (0); dummy codes used for T → T analysis: mixed culture (0), single culture Chinese (-1), single culture American (1).

[c] Dummy codes used for I → I analysis: single culture American (0), single culture Chinese (0), single culture American and mixed culture (1), single culture Chinese and mixed culture (-1); this dummy code is not applicable for the T → T analysis.

Summary of Hierarchical Regression Results

We have summarized the results of the hierarchical regression analysis we report above in which sets of cultural values, personality traits and cognition were entered as predictors. As seen in Table 75, with one exception power distance and individualism/collectivism did not predict teamwork or error behaviors at either level of analysis. Schwartz cultural values were slightly more predictive. FMAQ values were most predictive at both individual and team levels of analysis. As seen in Table 76, personality traits measured with the CPAI were more predictive than traits measured with the NEO. Personality traits were most predictive at the individual level of analysis. As seen in Table 77, SMM and the TLX measure of workload were most predictive among the set of cognition variables. TLX predicted teamwork and error behaviors at both levels of analysis. SMM predicted teamwork and error behaviors at the team level of analysis. In all regression analyses the dummy coded variables representing the experimental condition explained significant change in the R^2 at both the individual and team level of analysis. This result shows that the cultural composition of the crews that we created predicted teamwork and error behaviors after controlling for the influence of cultural values, personality traits and cognition.

Table 75. *Summary of Significant Regression Equations for Sets of Culture Variables*

Criteria	PD/IC R^2	PD/IC Exp ΔR^2	FMAQ R^2	FMAQ Exp ΔR^2	Schwartz R^2	Schwartz Exp ΔR^2
I → I						
Teamwork						
Assertiveness	.01	.07*	.04	.07*	.09	.07*
Backup	.02	.05	.03	.07*	.07	.06*
Communication	.01	.15*	.04	.13*	.08	.14*
Coordination	.00	.22*	.08*	.15*	.10	.17*
Decision making	.03	.09*	.11*	.03	.10	.06*
Feedback	.00	.01	.02	.01	.09	.01
Monitoring	.02	.03	.04	.02	.08	.02
Situational awareness	.04	.08*	.13*	.08*	.12*	.10*
Team leadership	.03	.11*	.03	.09*	.05	.09*
Error Management						
Communication errors	.00	.12**	.07**	.08**	.06	.09**
Non-compliance errors	.01	.02	.03	.01	.03	.02
Operational dec. errors	.02	.03	.02	.04	.06	.05**
Proficiency errors	.01	.01	.01	.02	.09	.01
T → T						
Teamwork						
Assertiveness	.03	.04	.07*	.03	.11	.03
Backup	.03	.02	.03	.03	.08	.05
Communication	.01	.06	.07	.04	.10	.05
Coordination	.01	.18*	.10*	.09*	.11	.11*
Decision making	.04	.10*	.12*	.05	.15*	.07*
Feedback	.01	.01	.03	.01	.12	.01
Monitoring	.06*	.00	.03	.00	.06	.00
Situational awareness	.03	.12*	.12*	.04	.11	.05
Team leadership	.01	.00	.01	.00	.06	.00
Error Management						
Communication errors	.02	.12**	.08**	.08**	.15**	.09**
Non-compliance errors	.03	.01	.02	.01	.12	.00
Operational dec. errors	.01	.01	.03	.01	.09	.01
Proficiency errors	.00	.01	.01	.02	.10	.01

* $p \leq .011$ ** $p \leq .025$

Table 76. *Summary of Significant Regression Equations for Sets of Personality Variables*

Criteria	CPAI R^2	CPAI Exp ΔR^2	NEO R^2	NEO Exp ΔR^2
I → I				
Teamwork				
Assertiveness	.11*	.06*	.03	.07*
Backup	.05	.08*	.06	.05
Communication	.07	.13*	.03	.15*
Coordination	.11*	.14*	.04	.21*
Decision making	.14*	.02	.02	.09*
Feedback	.08	.02	.03	.01
Monitoring	.04	.01	.03	.02
Situational awareness	.18*	.05	.05	.13*
Team leadership	.05	.08*	.03	.09*
Error Management				
Communication errors	.11**	.05**	.03	.21**
Non-compliance errors	.05	.01	.02	.02
Operational decision errors	.02	.03	.01	.04
Proficiency errors	.05	.01	.03	.02
T → T				
Teamwork				
Assertiveness	.17*	.03	.04	.04
Backup	.10	.04	.04	.04
Communication	.07	.04	.03	.06
Coordination	.11	.09*	.06	.15*
Decision making	.11	.05	.04	.11*
Feedback	.11	.00	.02	.01
Monitoring	.11	.00	.02	.00
Situational awareness	.15	.03	.06	.09*
Team leadership	.07	.00	.03	.00
Error Management				
Communication errors	.16**	.04**	.11**	.09**
Non-compliance errors	.08	.00	.07	.02
Operational decision errors	.04	.00	.02	.02
Proficiency errors	.10	.01	.03	.01

* $p \leq .011$ ** $p \leq .025$

Table 77. *Summary of Significant Regression Equations for Sets of Cognition Variables*

Criteria	EFT R^2	EFT Exp ΔR^2	SMM R^2	SMM Exp ΔR^2	TLX R^2	TLX Exp ΔR^2
I → I						
Teamwork						
Assertiveness	.03	.08*			.10*	.01
Backup	.00	.06*			.03	.02
Communication	.00	.16*			.06*	.04*
Coordination	.00	.22*			.05	.14*
Decision making	.02	.09*			.05	.05*
Feedback	.00	.01			.03	.01
Monitoring	.01	.02			.07*	.01
Situational awareness	.01	.16*			.06*	.05*
Team leadership	.03	.10*			.07*	.01
Error Management						
Communication errors	.01	.12**			.02	.05**
Non-compliance errors	.00	.02			.01	.01
Operational dec. errors	.00	.04			.02	.01
Proficiency errors	.00	.02			.03	.00
T → T						
Teamwork						
Assertiveness	.06*	.05	.02	.04	.15*	.02
Backup	.00	.03	.01	.03	.03	.01
Communication	.03	.07*	.00	.07*	.12*	.04
Coordination	.00	.17*	.08*	.15*	.10	.11*
Decision making	.04	.12*	.02	.10*	.10	.06*
Feedback	.00	.01	.00	.01	.04	.00
Monitoring	.02	.00	.02	.00	.02	.00
Situational awareness	.00	.12*	.05*	.10*	.12*	.06*
Team leadership	.03	.00	.03	.00	.03	.00
Error Management						
Communication errors	.01	.13**	.01	.11**	.08	.08**
Non-compliance errors	.00	.02	.00	.02	.04	.01
Operational dec. errors	.00	.01	.00	.01	.02	.01
Proficiency errors	.00	.01	.00	.01	.02	.01

* $p \leq .011$ ** $p \leq .025$

SUMMARY AND CONCLUSIONS

We reported the results of a laboratory experiment designed to examine the influence of crew culture, cultural values, personality traits, and cognition on team behaviors that comprise CRM, error management and flight outcomes using Microsoft Flight Simulator. The experimental design allowed comparison of single culture American and single culture Chinese crews and mixed culture crews. We expected that mixed culture crews would report fewer team behaviors, less error management, and fewer successful flight outcomes. We did not predict differences between single culture American and Chinese crews. We also examined the joint impact of crew culture combined with cultural values, personality traits and cognition. We expected that cultural values, personality traits and cognition would predict teamwork behaviors and error behaviors. We expected that crew culture would continue to explain variation in teamwork and error behaviors after controlling for cultural values, personality traits and cognition.

We have organized discussion of results into seven sections. Section one discusses the relationship among two components of flight crew performance: error management and flight outcomes. Section two focuses on teamwork as a predictor of error management and flight outcomes. Section three focuses on comparison of single culture and mixed culture crews in terms of teamwork, error management and flight outcomes. Section four discusses cultural values as predictors of teamwork and error management. Section five discusses the impact of universal personality traits and indigenous Chinese personality traits on teamwork and error management. Section six discusses the impact of cognition on teamwork and error management. We also discuss the impact of the single culture and mixed crews on these outcomes after controlling for cultural values, personality and cognition. The seventh and final section discusses the use of multiple levels of analysis in CRM research as well as the limitations of our research.

Error Management and Flight Outcomes

Based on the work of Helmreich and his colleagues (Helmreich, et al., 1999; Helmreich et al., 2001; Klinect et al., 1999), we expected to find that crews that committed more errors in flight would also produce less effective flight outcomes. In other words, error management was expected to partially mediate the relationship between teamwork behaviors and flight outcomes.

Flight outcomes were coded as safe landing or crash of the aircraft. At both the individual and team levels of analysis, we failed to find the expected relationship between error behaviors and flight outcomes. Failure to discover this relationship was likely due to limited variability in the error behavior variables. About one third of flight outcomes ended in a crash, providing sufficient variability in this variable, but the range of responses for the four error behaviors was limited. The frequency of each error behavior in each condition was, on average, less than four with a standard deviation typically the size of the mean. Proficiency errors were committed most often, but these were still committed with low frequency. The low frequency of error behaviors may have been due to the simplicity of the aircraft (Cessna 189S) used in the simulation as well as the nature of the simulation itself.

Despite the failure of error management to predict flight outcomes in our data, we believe that error management is an important ingredient of flight performance and deserves further study. Error management is an important antecedent to flight outcome that can be influenced by teamwork, as we discuss below, and is thus subject to improvement by training in CRM. We expect that more sophisticated and challenging experimental simulations will yield greater frequency and variation in error behaviors and, as a result, be more likely to be detected in future research.

Teamwork, Error Management and Flight Outcomes

Based on previous CRM research (e.g., Salas, Bowers, & Edens, 2001), we expected to find that teams that demonstrated more teamwork would commit fewer errors in flight and produce more effective flight outcomes. The logistic regression results provide support for this hypothesis. Teamwork behaviors predicted flight outcomes at both the individual and team levels of analysis. At the individual level of analysis the results showed that crews were more likely to crash their aircraft if coordination and team leadership were low. Crews were also more likely to crash if monitoring was high.

Results at the team level of analysis supported results at the individual level. Crews were more likely to crash the aircraft if coordination and team leadership were low and monitoring was high. Moreover, crews were more likely to crash the aircraft if situation awareness was high. In sum, crews that had poor coordination and weak team leadership were unable to take advantage of what was gleaned from monitoring and situation awareness. As shown by others (Ginnett, 1993; Hackman, 1993; Helmreich & Foushee, 1993), team leadership and coordination are essential to CRM and flight crew success.

Our expectation that teamwork behaviors would predict error management was confirmed. At the individual level of analysis, teamwork predicted non-compliance errors. Contrary to expectations, greater team leadership and monitoring were associated with more non-compliance errors. Consistent with expectations, less assertiveness was associated with more non-compliance errors. Communication errors were predicted by monitoring and coordination. Teams that did more monitoring and communicated less frequently committed more communication errors. Proficiency errors were predicted by situation awareness, communication, and monitoring. Teams that demonstrated greater situation awareness, less communication and less monitoring made more proficiency errors. Operational decision errors were predicted by situation awareness, coordination, and communication. Teams that demonstrated greater situational awareness, less coordination and less communication made more operational decision errors.

At the team level of analysis, non-compliance errors were predicted by situational awareness. Teams that demonstrated more situational awareness also demonstrated more non-compliance errors. Communication errors were predicted by situational awareness and coordination. Teams that demonstrated greater situational awareness and less coordination made more communication errors. Proficiency errors were predicted by situational awareness and team leadership. Teams that demonstrated more situational awareness and team

leadership made more proficiency errors. Operational decision errors were predicted by situational awareness, team leadership, coordination, and assertiveness. Teams that demonstrated more situational awareness and team leadership and less coordination and assertiveness made more operational decisional errors.

As expected, at both levels of analysis increased coordination and assertiveness resulted in fewer errors. The unexpected relationships at both the individual and team levels of analysis are likely due to the task and the training provided to prepare for it. Increased monitoring and situational awareness resulted in crews detecting and recognizing the seriousness of the anomalies programmed into the simulation. Increased leadership occurred as a result of actions taken to address these emerging problems. The result of this increased activity was failure to perform several routine flight requirements, for example, entering required data on the kneeboard. These errors resulted from task overload, a phenomenon commonly resulting from splitting cognitive resources among multiple attempts to manage aircraft malfunctioning (Bowers, Braun & Morgan, 1997). Management of errors in this simulation may have improved over time as student pilots gained more experience and improved their skill.

The results at both the individual and team level of analysis show that teamwork behaviors predicted error management behaviors and flight outcomes. These findings show promise for future research. One important direction for future research is examination of the reciprocal relationship between teamwork and error management. For example, commission of more errors may increase monitoring and team leadership, which may, over time, reduce commission of errors. Such a relationship may help to explain the unexpected positive relationship found in our data between increased situational awareness and team leadership and increased commission of errors. If our crews had interacted for a longer duration, the relationship between these factors may have moved in the expected negative direction as situational awareness and team leadership began to reduce commission of errors. Such reciprocal relationships could be studied more clearly in crews that perform together for long periods of time.

Single Culture and Mixed Culture Crews

Previous research has shown that cultural differences exist in CRM (Helmreich & Merritt, 1998; Merritt & Helmreich, 1995). This research has focused chiefly on cultural variation in reaction to (attitudes toward) CRM components. Some research has looked at the influence of cultural composition on the performance of teams, typically comparing single culture teams to mixed culture teams. In general, mixed culture teams experience more conflict, have difficulty developing coordination, and perform more poorly, typically due to greater process losses (Earley & Gibson, 2002). We are unaware of any research that directly compares CRM performance among crews comprised of members from different cultures. We expected to find that mixed culture crews compared to single culture crews would demonstrate less teamwork and commit more errors and produce less effective outcomes. Our data provide mixed support for this hypothesis.

Contrary to our expectations, team type had no impact on flight outcomes at either the individual or team level of analysis. Crashes were about equally distributed across Chinese and American single culture teams and mixed culture teams. About one-third of all flights across all conditions resulted in a crash.

Error management varied with type of team. At both the individual and team level of analysis, mixed culture and Chinese single culture teams made more communication errors than American single culture teams. There were no significant differences across team type for the other indicators of error management. As pointed out by Kanki and Palmer (1993), communication in the cockpit helps to establish relationships and predictable behavior patterns. When crew members do not share the same cultural background or native language, communication errors are more likely and communication is less able to strengthen the teamwork required for CRM. One might argue that, since English is the language of international aviation, crew members do speak the same language—English. This is an oversimplification, however, because it neglects the impact of the manner in which other cultural influences such as assertiveness and power distance are bundled with native language (Matsumoto & Juang, 2004) and the manner in which language acquisition itself shapes cognitive processes (Pinker, 1997). Moreover, research on bilingualism shows that temporary declines occur in thinking ability and cognitive processing when people use a foreign language in which they are less proficient than their native language (Takano & Noda, 1993). In mixed culture crews with non-native English speaking crew members such cognitive declines are more likely, particularly under high task workload and stress.

Team behaviors also varied as a function of crew culture. At the individual level of analysis, American single culture teams compared to mixed culture teams demonstrated more assertiveness, communication, coordination, decision making, and situational awareness. There were no significant differences in teamwork between Chinese single culture teams and mixed culture teams. Differences in backup approached significance, with Chinese single culture teams demonstrating more backup than American single culture or mixed culture teams. Differences in demonstration of teamwork behaviors remained after controlling for the influence of posttest flight knowledge, an indicator of flying skills acquired during training.

At the team level of analysis, American single culture teams also demonstrated more assertiveness, communication, coordination, decision making, and situational awareness. There were no significant differences in teamwork between Chinese single culture teams and mixed culture teams. In sum, American single culture teams performed better than Chinese single culture teams or mixed culture teams; Chinese and mixed teams performed about equally well. These differences remained after controlling for posttest flight knowledge, an indicator of flying skills obtained during training.

The multiple regression results show further that crew culture continues to predict teamwork and error behaviors after entering measures of cultural values, personality traits, and cognition in the first step of the hierarchical multiple regression equations. In other words, teamwork and error behaviors continue to be influenced by the cultural composition

of the team after controlling for individual differences among team members. We discuss these results in more detail below.

In sum, as expected, mixed culture teams demonstrated less teamwork and committed more errors than single culture teams. We did not have any expectations about the relative performance of American and Chinese single culture teams. We discovered that American single culture teams demonstrated more teamwork and committed fewer errors than Chinese single culture teams. Chinese single culture teams, however, demonstrated more backup than single culture American teams. Observed cultural differences in teamwork and error behaviors remained after controlling for the effect of flying knowledge and skill.

These findings confirm results obtained in another study we have conducted for NASA-LARC (Davis et al., 2005). In this study, we conducted interviews of flight instructors in the United States and England who had extensive experience training and flying with pilots from many nations throughout the world. Flight instructors confirmed that mixed culture flight crews demonstrate less teamwork, especially communication and crew coordination, and commit more errors. Moreover, language differences and cultural values contribute to difficulty in managing CRM in mixed culture crews. These results point to an important direction for future research.

Cultural Values, Teamwork and Error Management

We studied three sets of values demonstrated empirically to vary across cultures: (1) individualism/collectivism and power distance, as defined in the work of Hofstede (1980); (2) flight management attitudes (FMAQ) taken from the work of Helmreich and colleagues (Helmreich & Merritt, 1998; Merritt, 1996; Sexton et al., 2001); and (3) cultural values taken from the work of Schwartz (Schwarz, 1992, 1999; Schwartz & Bilsky, 1990; Schwartz & Sagiv, 1995). We selected these variables based on previous reviews of the literature examining culture and CRM (Davis, 1999; Helmreich & Merritt, 1998). We expected to find that cultural values would be related to teamwork and error management. We did not make specific productions concerning the direction or magnitude of these relationships.

Contrary to expectations, individualism/collectivism and power distance were not related to teamwork or error management, with one exception: power distance predicted six percent of the variance in monitoring at the team level of analysis. Crews that were low in power distance were more likely to demonstrate monitoring behaviors.

Power distance and individualism and collectivism are two of the most influential cultural values in aviation (Helmreich & Merritt, 1998), yet we failed to detect their influence. One explanation is that the flight simulation we used may not have allowed sufficient time for these cultural values to influence teamwork and error behaviors. Each scenario lasted less than one hour. Moreover, the task may have been so challenging, that cultural variation was drowned out by more salient influences, for example, personality traits and workload. Another explanation may be due to the modest reliability of the scales: IC scale (alpha = .75) and PD scale (alpha = 72). Although these reliabilities exceed minimum

standards for psychometric quality, these scales may have been insufficiently sensitive to assess the influence of these cultural values.

We explored the relationship between flight values/attitudes and teamwork, error management and flight outcomes. The measure used to assess flight values/attitudes (FMAQ) was developed to be used with professional pilots and has been used extensively throughout the airline industry. The apriori factor structure was not duplicated in our sample. After discussion with Ashleigh Merritt, who developed the original scale (personal communication, August 19, 2003), we adapted it through factor analysis to make it relevant to students in our sample. We found that three of the four FMAQ scales we created predicted teamwork and error management. At the individual level of analysis, flight management values/attitudes predicted the following teamwork outcomes: coordination (work satisfaction), decision making (interpersonal relationship quality, work satisfaction) and situational awareness (work structure, work satisfaction). Flight management values/attitudes also predicted communication errors (work structure). Participants who seek satisfaction in their work demonstrate greater coordination, make more decisions and show greater situation awareness. Those who expressed less concern with maintaining harmonious relationships with others made more decisions. Those who seek structure and predictability in their work environment demonstrated less situation awareness and made more communication errors.

At the team level of analysis, flight management values/attitudes predicted assertiveness (work structure), coordination (work structure), decision making (work structure and work satisfaction), and situation awareness (work satisfaction). These findings parallel those at the individual level of analysis, except for the addition of the relationship between work structure and assertiveness—teams that place less emphasis on a structured and predictable work environment demonstrated greater assertiveness.

The Schwartz values predicted situational awareness at the individual level of analysis. Participants placing less value on social status and prestige (i.e., less value for power) demonstrated more situational awareness. Decision making and communication errors were predicted at the team level of analysis. Participants reporting less concern for benevolence and tradition demonstrated more decision making. Participants valuing universalism committed more communication errors. The scarcity of results and absence of a pattern in the influence of the Schwartz values cause us to refrain from drawing conclusions about their impact.

Hierarchical multiple regression analysis entering each set of cultural values in step one, followed by entry of the experimental condition in step two, showed that crew culture continued to explain differences in teamwork and error behaviors after controlling for the influence of the cultural values we measured. This result suggests that the cultural values examined in our analysis are insufficient to explain the impact of team culture. Future research should examine the influence of additional cultural values when studying single culture and mixed culture teams. Other types of team tasks may also yield more positive results.

Personality, Teamwork and Error Management

Two measures of personality were used to explore the impact of personality traits on teamwork and error management. We used the NEO to assess universal personality traits and the CPAI to assess personality traits indigenous to Chinese culture. We administered both scales to American and Chinese subjects to ensure comparability. Moreover, despite the fact that the CPAI was developed to assess traits important in Chinese culture, we believe that people from other cultures are also likely to endorse the traits that it measures. For example, although face (maintain an image of self that presents positive social attributes) is an important concern for Chinese people, it is important for others as well, including Americans. In fact, concerns with face and attempts to maintain and enhance it are important in interpersonal relationships around the globe (Earley, 1997).

At the individual level of analysis the set of CPAI traits predicted four of nine teamwork behaviors: assertiveness, coordination, decision making, and situational awareness. It also predicted communication errors. Assertiveness was predicted by renqing. Those who placed importance on social reciprocity demonstrated more assertiveness. Coordination was predicted by locus of control. Those with greater internal locus of control displayed greater team coordination. Decision making was predicted by harmony. Those who placed less value on maintaining harmonious relationships made more decisions. Situation awareness was predicted by internal/external locus of control. Those who were more internal in their locus of control demonstrated greater situation awareness. Communication errors were predicted by harmony. Those who placed more value on maintaining harmonious relationships committed more communication errors.

At the team level of analysis the CPAI predicted assertiveness and communication errors. Again, renqing predicted assertiveness, with those reporting less concern for social reciprocity demonstrating more assertiveness. Harmony and locus of control predicted communication errors. Teams with members expressing greater concern for harmony and external locus of control made more communication errors.

CPAI facets predicted teamwork behaviors and error management at both the individual and team level of analysis. Those who placed less value on social reciprocity, reported greater internal locus of control and placed less value on maintaining harmonious relationships demonstrated more teamwork and committed fewer communication errors.

Personality traits measured with the NEO predicted only communication errors at the team level of analysis. Agreeableness and openness to experience were significant traits. Teams with members who were more agreeable (i.e., more trusting and cooperative) and less open to new ideas and experiences made more communication errors

Our results demonstrate the usefulness of the CPAI in the cross-cultural study of teamwork and CRM and confirm the recommendations of others to blend indigenous and universal approaches to the study of personality (Cheung & Leung, 1998). Combining indigenous approaches to the study of personality with universal approaches will enhance

explanation and prediction of important behaviors in cross-cultural contexts. Renqing and preference for harmony, two indigenous Chinese traits, seem particularly relevant to CRM and crew performance. The influence of these traits on CRM has been seen by flight instructors when training pilots from many nations (Davis et al., 2005). Future cross-cultural research in CRM should combine indigenous measures of personality with universal measures of personality.

Cognition, Teamwork and Error Management

We explored the relationship between three aspects of cognition and teamwork. Field dependence/independence (FDI), a type of cognitive style that explains differences in reliance on context when processing situational cues, was the first relationship we examined. At the individual level of analysis, predictions of assertiveness and team leadership approached the Bonferroni adjusted level of significance. In both cases, higher field independence was associated with more assertiveness and team leadership. At the team level of analysis, field independence was also related to assertiveness. Teams that on average reported more field independence were more assertive. There was no relationship between FDI and error behaviors.

Field independence represents processing of perceptual cues without reliance on surrounding context, that is, reliance on internal cues for assembling perceptions (Berry et al., 2002, p. 138). Field independence is a characteristic of "autonomous functioning" (Witkin et al., 1979, p. 1138). This autonomy leads to reduced orientation toward social engagement. It is easy to see how such a cognitive style could increase assertiveness and team leadership. Opinions may be expressed and actions may be taken without regard for maintaining harmony or balance in interpersonal relationships.

The FDI cognitive style is a pervasive aspect of individual functioning, influencing perception, cognition, personality, and social interaction (Berry et al., 2002, p. 138). Since there are consistent cultural differences in FDI (Berry et al., 2002), and since FDI underlies a number of other factors that may contribute to CRM factors such as assertiveness and team leadership, it deserves further study.

SMM was the second aspect of cognition that we examined. Because SMM represents shared cognition among team members, this was analyzed only at the team level of analysis. We expected to find a positive relationship between SMM and team outcomes and effective error management (i.e., a negative relationship with error behaviors). SMM predicted team coordination and situational awareness. Teams that reported a greater SMM also demonstrated more coordination and situational awareness. Contrary to expectation, there was no relationship between SMM and error management.

This result is consistent with findings reported by Mathieu and colleagues (2000), who found that simulated crews developed shared mental models for team and task related activities, and that both types of SMM were related to teamwork and team performance; teamwork and team performance increased as teams converged toward the same SMM. Moreover, teamwork mediated the relationship between SMM and team performance.

The final aspect of cognition that we measured was the influence of various aspects of task load on teamwork and error management. Because we used a conceptualization and measure of task load (TLX) that was developed at NASA (Hart & Staveland, 1988) and has received little research attention, we made no predictions about direction or magnitude of the expected relationships.

At the individual level of analysis, TLX was related to assertiveness (effort, performance, physical work load), communication (performance), decision making (physical workload), monitoring (physical workload), situational awareness (physical workload), and team leadership (physical workload). Increased perceived physical workload was related to reduced assertiveness, decision making, monitoring, situational awareness, and team leadership. Assertiveness was also associated with greater performance and effort. Communication was associated with greater performance

The findings at the team level of analysis parallel those at the individual level of analysis. TLX was related to assertiveness (effort, performance, physical workload), communication (effort, performance), coordination (physical workload), decision making (physical workload), and situational awareness (physical workload). Greater physical workload was associated with declines in assertiveness, coordination, decision making, and situational awareness. Assertiveness was also associated with greater effort and performance. Communication was associated with greater performance.

TLX did not predict error management at either the individual or team level of analysis although it did predict flight outcomes. At both the individual and team level, crashing the aircraft was predicted by performance. Not surprisingly, teams that thought they performed well were less likely to crash the aircraft.

Results concerning physical workload at both the individual and team levels of analysis are important since pilot workload contributes to efficiency and safety (Kantowitz & Casper, 1988). This finding shows that workload leads to declines in performance through decline in teamwork behaviors. Moreover, crew members must exert extra mental and physical energy (effort) to be assertive. Crew members that feel that their teams are successful demonstrate more assertiveness and communication.

Our results show that the TLX is useful for predicting the teamwork components included in CRM training and should be studied more in the future. Its usefulness for predicting error management is less clear.

Levels of Analysis in CRM Research

Our research employed two levels of analysis: individual and team. At the individual level of analysis, we examined relationships between variables for each individual. At the team level of analysis, we used the scores of each team member to create a team average score. We then examined relationships between variables using team average scores. Support

for this multiple levels approach to the study of organization behavior is growing (Klein & Kozlowski, 2000), but it is new in the study of CRM.

We employed two levels of analysis for three reasons. First, recent research examining teamwork has been inconsistent in demonstrating the superiority of one level versus another. Variables traditionally studied at the individual level of analysis—for example cognition and personality traits—have also been found to exist at the team level of analysis (Neuman & Wright, 1999; Barrick, et al., 1998). Results have been inconsistent, however, due to examination of different types of teams, traits and tasks. For example, selection of the appropriate level should be guided by the type of task. Aggregating individual responses to create team average scores may be most justified for tasks that are additive, that is, where each team member's contribution is combined to create a single team outcome, whereas using individual level responses may be more appropriate when team performance can be influenced by the strong or weak performance of a single individual (Neuman & Wright, 1999). Both types of task occur in crew performance, so both individual and team levels of analysis seem justified. Second, predictor-criterion relationships can change with different levels of analysis (Ostroff, 1993). Significant relationships may appear or disappear as the level of analysis changes. Third, when only one level of analysis is examined in isolation, it is not possible to compare variable relationships at different levels to determine if different processes are operating at the individual and team levels (Rousseau, 1985).

In our results, cultural differences and workload appear to predict equally well at the individual and team level of analysis. Relationships that were significant at one level were often significant at the other level as well. In particular, TLX and scores on the constructs we created from the FMAQ predicted several aspects of teamwork and error management at both levels of analysis. This pattern of results suggests that workload and the constructs being measured by the FMAQ operate at both the individual and team level of analysis. Personality variables, on the other hand, appear to be most predictive at the individual level of analysis. For example, the CPAI predicted five team and error behaviors at the individual level but only predicted two criteria at the team level, although the individual and team level results supported one another.

Our results support the recommendation of Rousseau (1985) that exploration of multiple levels of analysis allows one to identify whether variables operate similarly at different levels. We believe that this multiple levels approach to research is important. We encourage other researchers in CRM to explore the relative influence of individual and team levels of analysis.

Limitations of the Research

One important limitation in our research was operationalization of crew culture. Because all participants were paid and financial resources were limited, we needed to use in the mixed team condition approximately half of the team members who also participated in the single culture condition. We used a different scenario and different crew composition in the mixed condition to ensure independent crew performance. We also counterbalanced

assignment to the mixed condition; half of the crews completed the mixed culture condition first followed by the single culture condition. We also counterbalanced assignment to the flying pilot role to reduce carryover effects; participants completing the first condition as flying pilot were assigned the role of non-flying pilot in the second scenario. Nevertheless, mixed culture condition membership was not totally independent with single culture condition membership and this may have influenced our results

Another limitation of this research is the use of undergraduate students flying a desktop computer simulation. Without question, students are not professional pilots. They lack the many years of training and experience flying and working with others in flight crews. In contrast, crews in our study were newly formed, provided only twelve hours of training, and had never flown as a member of flight crew before their participation in this study. Moreover, students flew a low fidelity flight simulation that shares few characteristics with high fidelity, professional flight simulators. This naturally raises important questions about the generalizability of our results. We believe that the generalizability of our results may be limited to some extent, but we believe our results are still relevant to CRM. For example, our flight scenarios were dynamic and unpredictable, required interdependence, and elicited thousands of instances of teamwork behaviors that were reliably coded by objective, independent raters who were blind to the research hypotheses. Moreover, the task was engaging and challenging as evidenced by the importance of workload as a predictor of teamwork and error management. Furthermore, low fidelity simulations are common in team research, and they identify patterns of relationships that are often replicated in the field (Driskell & Salas, 1992; Weaver, Bowers, Salas, & Canon-Bowers, 1995). Perhaps most importantly, the influence of cultural and individual differences may be stronger in students than professional pilots, because training, flightdeck design, and international regulations serve to standardize individual and crew performance and reduce the impact of individual and cultural differences. Indeed such standardization is one of the aims of flight training (Davis et al., 2005).

Our student participants had no expectation of future interaction and, of course, their performance had no impact on career success. Moreover, the simulated flights lasted less than one hour, limiting the time for team evolution and maturation. Nevertheless, aircraft crews are often formed with short notice and fly short segments, and crew composition changes frequently (Ginnett, 1990). In both student and professional crews, flights must be planned, role relationships must be established, limited resources must be managed, and the performance of humans and equipment must be integrated successfully in a short time. Moreover, performance requires integrated effort and team coordination.

We believe that the pattern of our results is generalizable to professional pilots and CRM. Cultural differences, individual differences and crew cultural composition influence teamwork and error management, although there may be point-to-point variability if this model were to be tested in professional flight crews. Reduced generalizability is a price that will be necessary to pay since testing cultural relationships with the type of control over crew culture that was possible with a laboratory simulation would be very expensive, and perhaps impossible, with professional pilots flying in high fidelity simulators.

Future research will have to test the generalizability of our model of teamwork, error management and flight crew performance in other samples of single culture and mixed culture teams using other tasks. Line operational flight training (LOFT; Butler, 1993) provides an ideal opportunity to study single culture and mixed teams. Research designs that study behavior in context, such as work on situated cognition (Hutchins, 1999), provides another possibility. In such designs naturally formed single culture and mixed culture teams could be studied for long periods of time. Both approaches provide research settings that would yield results perhaps more generalizable then the research design used here. With both alternatives, however, experimental control of crew composition would be difficult. A level of fidelity midway between laboratory research designs and naturalistic field research and that balances fidelity and control would be comparison of crews with different cultural composition that receive training in high fidelity flight simulators. This would be a valuable direction for future research.

REFERENCES

Barrick, M. R., & Mount, M. K. (1991). The Big Five personality dimensions and job performance: A meta-analysis. *Personnel Psychology, 44,* 1-126.

Barrick, M. R., Stewart, G. L., Neubert, M. J., & Mount, M. K. (1998). Related member ability and personality to work-team processes. *Journal of Applied Psychology, 83,* 377-391.

Berry, J. W. (1990). Cultural variations in cognitive style. In S. Wapner (Ed.), *Bio-psycho-social factors in cognitive style* (pp. 289-308). Hillsdale, NJ: Erlbaum.

Berry, J. W. (1991). Cultural variation in field-dependence-independence. In S. Wappner & J. Demick (Eds.), *Field dependence-independence: Cognitive styles across the life span* (pp. 289-308). Hillsdale: Erlbaum.

Berry, J. W., Poortinga, Y. H., Segall, M. H., & Dasen, P. R. (2002). *Cross-cultural psychology: Research and applications* (2nd Ed.). Cambridge: Cambridge University Press.

Bond, M. H. (1996). *The handbook of Chinese psychology*. Hong Kong: Oxford University Press.

Bowers, C. A., Braun, C. C., & Morgan, B. B. Jr. (1997). Team workload: Its meaning and measurement. In M. T. Brannick, E. Salas, & C. Prince (Eds.), *Team performance assessment and measurement* (pp. 85 – 108). Mahwah: Lawrence Erlbaum Associates.

Bowers, C. A., Morgan, B. B., Jr., Salas, E., & Prince, C. (1993). Assessment of coordination demand for aircrew coordination training. *Military Psychology, 5,* 95-112.

Butler, R. E. (1993). LOFT: Full-mission simulation as crew resource management training. In E. L. Wiener, B. G. Kanki, & R. L. Helmreich (Eds.), *Cockpit resource management*. (pp. 231-259). San Diego, CA: Academic Press.

Canon-Bowers, J. A., & Salas, E. (1990). *Cognitive psychology and team training: Shared mental models in complex systems.* Paper presented at the annual meeting of the Society for Industrial and Organizational Psychology. Miami, Florida.

Cannon-Bowers, J. A., & Salas, E. (1990). *Cognitive psychology and team training: Shared mental models in complex systems.* Paper presented at the fifth annual conference of the Society for Industrial and Organizational Psychology, Miami.

Chen, C. C., Meindl, J. R., & Hunt, R. G. (1997). Testing the effects of vertical and horizontal collectivism: A study of reward allocation preferences in China. *Journal of Cross-Cultural Psychology, 28,* 44-70.

Cheung, F. M., & Leung, K. (1998). Indigenous personality measures: Chinese examples. *Journal of Cross-Cultural Psychology, 29,* 233-248.

Cheung, F. M., Leung K., Fan, R. M., Song, W. Z., Zhang, J. X., & Zhang, J. P. (1996). Development of the Chinese Personality Assessment Inventory. *Journal of Cross-Cultural Psychology, 27,* 181-199.

Cheung, F. M., Leung K., Zhang, J. X., Sun, H. F., Gan, Y. Q., Song, W. Z., & Xie, D. (2001). Indigenous Chinese personality constructs: Is the Five-Factor Model complete? *Journal of Cross Cultural Psychology, 32,* 407-433.

Costa, P. T. (1996). Work and personality: Use of the NEO PI- R in Industrial/Organizational Psychology. *Applied Psychology: An International Review, 45,* 225-241.

Costa, P. T., & McCrae, R. R. (1992). Four ways five factors are basic. *Personality and Individual Differences, 13,* 653-665.

Costa, P. T., & McCrae, R. R. (1997). Stability and change in personality assessment: The Revised NEO Personality Inventory in the Year 2000. *Journal of Personality Assessment, 68,* 86-94.

Craig, P. A. (1997). *Light airplane navigation essentials.* New York: McGraw Hill.

Davis, D. D. (1998). International performance measurement and management. In J. W. Smither (Ed.), *Performance appraisal: State of the art in practice* (pp.95 - 131). San Francisco : Jossey-Bass.

Davis, D. D. (1999). *National culture and flightcrew effectiveness.* Hampton, VA: National Aeronautics and Space Administration – Langley Research Center.

Davis, D. D., Bryant, J. L., Downey, H., J., & Selgrade, K. A. (2005). *Culture and CRM Training: Notes from the Field.* Hampton. VA: National Aeronautics and Space Administration—Langley Research Center.

Davis, D. D., & Kuang, J. Y. (2000). *National culture, crew resource management and team performance.* Hampton, VA: National Aeronautics and Space Administration – Langley Research Center.

Dickinson, T. L., & McIntyre, R. M. (1997). A conceptual framework for teamwork measurement. In M. T. Brannick, E. Salas, & C. Prince (Eds.), *Team performance assessment and measurement: Theory, methods, and applications* (pp. 19-43). Hillsdale, NJ: Lawrence Earlbaum.

Driskell, J. E., & Salas, E. (1992). Can you study real teams in contrived settings? The value of small group research to understanding teams. In R. W. Swezey & E. Salas (Eds.), *Teams: Their training and performance* (pp. 101-126). Norwood: Ablex.

Earley, P. C. (1997). *Face, harmony, and social structure.* New York: Oxford University Press.

Earley, P. C., & Erez, M. (1997). *New perspectives on international industrial/organizational psychology.* San Francisco: The New Lexington Press.

Earley, P. C., & Gibson, C. B. (2002). *Multinational work teams: A new perspective.* Mahwah: Lawrence Erlbaum.

Federal Aviation Administration Human Factors Team (1996). *The interfaces between flight crews and modern flight deck systems.* Washington, DC: Author.

Fowlkes, J. E., Lane, N. E., Salas, E., Franz, T., & Oser, R. (1994). Improving the measurement of team performance: The TARGETs methodology. *Military Psychology, 6,* 47-61.

Ginnett, R. C. (1990). Airline cockpit crews. In J. H. Hackman (Ed.), *Groups that work (and those that don't)* (pp. 427-448). San Francisco: Jossey-Bass.

Ginnett, R. C. (1993). Crews as groups: Their formation and leadership. In E. L. Wiener, G. G. Kanki, & R. L. Helmreich (Eds.), *Cockpit resource management* (pp. 71-98). San Diego, CA: Academic Press.

Goodenough, D., & Karp, S. A. (1961). Field dependence and intellectual functioning. *Journal of Abnormal and Social Psychology, 63,* 241-246.

Gopher, D., & Donchin, E. (1986). Workload: An examination of the concept. In K. R. Boff, L. Kaufmann, & J. P. Thomas (Eds.), *Handbook of perception and human performance*, (Vol. II, pp. 41.1-41.49). New York: Wiley.

Hackman, J. R. (1993). Teams, leaders, and organizations: New directions for crew oriented flight training. In E. L. Wiener, B. G. Kanki, & R. L. Helmreich (Eds.), *Cockpit resource management* (pp. 47-69). San Diego, CA: Academic Press.

Hart, S. G., & Staveland, L. E. (1988). Development of NASA-TLX (Task Load Index): Results of empirical and theoretical research. In P. A. Hancock, & N. Meshkati (Eds.), *Human Mental Workload* (139-184). New York: Elsevier.

Hartel, C., Smith, K., & Prince, C. (1991). *Defining aircrew coordination: Searching mishaps for meaning.* Paper presented at the Sixth International Symposium on Aviation Psychology. Columbus, Ohio.

Helmreich, R. L. (1991). *Strategies for the study of flightcrew behavior.* Paper presented at the Sixth International Symposium on Aviation Psychology, Columbus, Ohio.

Helmreich, R. L., & Foushee, H. C. (1993). Why crew resource management? Empirical and theoretical bases of human factors training in aviation. In E. L. Wiener, B. G. Kanki, & R. L. Helmreich (Eds.), *Cockpit resource management* (pp. 3-45). San Diego, CA: Academic Press.

Helmreich, R. L., Klinect, J. R., & Wilhelm, J. A. (1999). Models of threat, error, and CRM in flight operations. In *Proceedings of the Tenth International Symposium on Aviation Psychology* (pp. 677-682). Columbus, OH: Ohio State University.

Helmreich, R. L., & Merritt, A. C. (1998). *Culture at work in aviation and medicine: National, organizational, and professional influences*. Brookfield, VT: Ashgate.

Helmreich, R. L., Merritt, A. C., Sherman, P. J., Gregorich, S. E., & Wiener, E. L. (1993). *The Flight Management Attitudes Questionnaires (FMAQ), NASA/UT/FAA Technical Report* (pp. 93-94). Austin, TX: Department of Psychology, University of Texas.

Helmreich, R. L., Wilhelm, J. A., Klinect, J. R., & Merritt, A. C. (2001). Culture, error, and crew resource management. In E. Salas, C. A. Bowers, & E. Edens (Eds.), *Improving teamwork in organizations: Applications of resource management training* (pp. 305 – 331). Mahwah: Lawrence Erlbaum Associates.

Helmreich, R. L., Wilhelm, J. A., Gregorich, S. E., & Chidester, T. R. (1990). Preliminary results from the evaluation of cockpit resource management training: Performance ratings of flight crews. *Aviation, Space, and Environmental Medicine, 61,* 576-579.

Ho, D. Y. (1998). Indigenous psychologies: Asian perspectives. *Journal of Cross Cultural Psychology, 29,* 88-103.

Hofstede, G. (1980). *Culture's consequences: International differences in work related values.* Beverly Hills, CA: Sage.

Hofstede, G. (1997). *Cultures and organizations: Software of the mind.* New York: McGraw-Hill.

Hofstede, G., & Bond, M. H. (1984). Hofstede's culture dimensions: An independent validation using Rokeach's Value Survey. *Journal of Cross-Cultural Psychology, 15,* 417-433.

Hutchins, E. (1999). *Cognition in the wild.* Cambridge: MIT Press.

Kanki, B. G., & Palmer, M. T. (1993). Communication and crew resource management. In E. L. Wiener, B. G. Kanki, & R. L. Helmreich (Eds.), *Cockpit resource management* (pp. 99-136). San Diego, CA: Academic Press.

Kantowitz, B. H., & Cambell, J. L. (1996). Pilot workload and flightdeck automation. In R. Parasuraman & M. Mouloua (Eds.), *Automation and human performance: Theory and applications* (pp. 117-136). Mahwah: Lawrence Erlbaum.

Kantowitz, B. H., & Casper, P. A. (1988). Human workload in aviation. In E. Wiener & D. Nagel (Eds.), *Human factors in aviation* (pp. 157-185). New York: Academic Press.

Karp, S. A. (1963). Field dependence and overcoming embeddedness. *Journal of Consulting Psychology, 27,* 294-302.

Klein, H. A. (2003). The cultural lens model: Understanding cognitive differences and aviation safety. In R. Jensen (Ed.), *12th International Symposium on Aviation Psychology*. (pp. 657-662). Dayton, OH: International Symposium on Aviation Psychology).

Klein, K. J., & Kozlowski, S. W. J. (2000). *Multilevel theory, research, and methods in organizations*. San Francisco: Jossey-Bass.

Klinect, J. R., Wilhelm, J. A., & Helmreich, R. L. (1999). Threat and error management: Data from line operations safety audits. In *Proceedings of the Tenth International Symposium on Aviation Psychology* (pp. 683-688). Columbus, OH: Ohio State University.

Kraiger, K., & Wenzel, L. H. (1997). Conceptual development and empirical evaluation of measures of shared mental models as indicators of team effectiveness. In M. T. Brannick, E. Salas, & C. Prince (Eds.), *Team performance assessment and measurement: Theory, methods, and applications* (pp. 63-84). Mahwah, NL: Lawrence Erlbaum.

Lauber, J. K. (1984). Resource management in the cockpit. *Airline Pilot, 53,* 20-23.

Leedom, D. K. (1990). *Aircrew coordination training and evaluation for Army rotary wing aircrews: Summary of research for fiscal year 1990.* Fort Rucker, AL: U.S. Army Research Institute Aviation Research and Development Activity.

Liang, K. (1999). *Fairness in Chinese organizations.* Unpublished doctoral dissertation. Norfolk, VA: Old Dominion University.

Machado, R. (1996). *Rod Machado's private pilot handbook: The ultimate pilot book.* San Clemente: The Aviation Speakers Bureau.

Markus, H. R., & Kitayama, S. (1998). The cultural psychology of personality. *Journal of Cross Cultural Psychology, 29,* 63-87.

Mathieu, J. E., Heffner, T. S., Goodwin, G. F., Salas, E., & Cannon-Bowers, J. A. (2000). The influence of shared mental models on team process and performance. *Journal of Applied Psychology, 85,* 273-283.

Matsumoto, D., & Juang, L. (2004). *Culture and psychology* (3rd ed.). Belmont, CA: Wadsworth/Thomson Learning.

McCrae, R. R., & Costa, P. T. (1997). Personality structure as a human universal. *American Psychologist, 52,* 509-516.

McCrae, R. R., Costa, P. T., Del Pilar, G. H., & Rolland, J. P. (1998). Cross-cultural assessment of the five-factor model. The revised NEO personality inventory. *Journal of Cross Cultural Psychology, 29,* 171-188.

McIntyre, R. M., & Salas, E. (1995). Measuring and managing team performance: Lessons from complex environments. In R. Guzzo, & E. Salas (Eds.), *Team effectiveness and decision-making in organizations* (pp. 9-45). San Francisco: Jossey Bass.

Merritt, A. C. (1996). *National culture and work attitudes in commercial aviation: A cross-cultural investigation.* Unpublished doctoral dissertation. Austin, TX: The University of Texas at Austin.

Merritt, A. C., & Helmreich, R. L. (1995). Culture in the cockpit: A multi-airline study of pilot attitudes and values. In *Proceedings of the Eighth International Symposium on Aviation Psychology* (pp. 676-681). Columbus, OH: Ohio State University.

Merritt, A. C., Helmreich, R. L., Wilhelm, J. A., & Sherman, P. J. (1996). *Flight Management Attitudes Questionnaire 2.0 (International) and 2.1 (USA/Anglo).* UT Technical Report 96-4. Austin, TX: The University of Texas at Austin.

Microsoft Flight Simulator 2000. (1999). *Pilot's Handbook.* Microsoft Corporation.

Morgan, B. B., & Bowers, C. A. (1995). Teamwork stress: Implications for team decision making. In R. A. Guzzo (Ed.), *Team effectiveness and decision making in organizations* (pp. 262 – 290). San Francisco: Jossey Bass.

Morrissette, J. O., Hornseth, J. P., & Shellar, K. (1975). Team organization and monitoring performance. *Human Factors, 17,* 296-300.

Neuman, G. A., & Wright, J. (1999). Team effectiveness: Beyond skills and cognitive ability. *Journal of Applied Psychology, 84,* 376-389.

Orasanu, J. M. (1990). *Shared mental models and crew decision-making.* (Tech. Rep. No. 46). Princeton, NJ: Princeton University.

Orasanu, J. M. (1993). Decision-making in the cockpit. In E. L. Wiener, B. G. Kanki, & R. L. Helmreich (Eds.), *Cockpit resource management* (pp. 137-172). San Diego, CA: Academic Press.

Ostroff, C. (1993). Comparing correlations based on individual-level and aggregated data. *Journal of Applied Psychology, 78,* 569-582.

Peng, K., & Nisbett, R. (1999). Culture, dialectics and reasoning about contradiction. *American Psychologist, 54,* 741-754.

Phelan, P. (1994, August 30). Cultivating safety. *Flight International*, pp. 22-24.

Piedomont, R. L., & Chae, J. (1997). Cross-cultural generalizability of the five-factor model of personality. *Journal of Cross Cultural Psychology, 28,* 131-155.

Pinker, S. (1997). *How the mind works.* New York: W. W. Norton & Co.

Prince, C., & Salas, E. (1993). Training and research for teamwork in the military aircrew. In E. L. Wiener, B. G. Kanki, & R. L. Helmreich (Eds.), *Cockpit resource management* (pp. 337-366.). San Diego, CA: Academic Press.

Redding, S. G., & Ogilvie, J. G. (1984). *Cultural effects on cockpit communications in civilian aircraft.* Paper presented at the Flight Safety Conference, Zurich, Switzerland.

Rouse, W. B., & Morris, N. M. (1986). On looking into the black box: Prospects and limits in the search for mental models. *Psychological Bulletin, 100,* 359-363.

Rousseau, D. (1985). Issues of level in organizational research: Multi-level and cross-level perspectives. In L. L. Cummings & B. M. Staw (Eds.), *Research in organizational behavior* (Vol. 7, pp. 1-37). Greenwich: JAI Press.

Salas, E., Bowers, C. A., & Edens, E. (2001). *Improving teamwork in organizations: Applications of resource management training.* Mahwah: Lawrence Erlbaum.

Schwartz, S. H. (1994). Beyond individualism/collectivism: New cultural dimensions of values. In U. Kim, H. C. Triandis, C. Kagitcibasi, S. C. Choi, & G. Yoon (Eds.),

Individualism and collectivism: Theory, method, and applications (pp. 85-119). Thousand Oaks, CA: Sage.

Schwartz, S. H. (1999). A theory of cultural values and some implications for work. *Applied Psychology: An International Review, 48,* 23-47.

Schwartz, S. H., & Bilsky, W. (1987). Toward a psychological structure of human values. *Journal of Personality and Social Psychology, 53,* 550-563.

Schwartz, S. H., & Bilsky, W. (1990). Toward a theory of the universal content and structure of values: Extensions and cross-cultural replications. *Journal of Personality and Social Psychology, 58,* 878-891.

Schwartz, S. H., & Sagiv, L. (1995). Identifying culture-specifics in the content and structure of values. *Journal of Cross-Cultural Psychology, 26*(1), 92-116.

Scott-Milligan, F. M., & Wyness, B. S. (1987). *Cockpit resource management: An antipodean view.* Paper presented at the Fourth International Symposium on Aviation Psychology. Columbus, OH: Ohio State University.

Sexton, J. B., Wilhelm, J. A., Helmreich, R. L., Merritt, A. C., & Klinect, J. R. (2001). *Flight Management Attitudes & Safety Survey (FMASS): A short version of the FMAQ* (Tech. Rep. No. 01-01). Austin: University of Texas.

Sherman, P. J., Helmreich, R. L., & Merritt, A. C. (1997). National culture and flight deck automation: Results of a multination survey. *The International Journal of Aviation Psychology, 7,* 311-329.

Stout, R. J., Cannon-Bowers, J. A., Salas, E., & Milanovich, D. M. (1999). Planning, shared mental models, and coordinated performance: An empirical link is established. *Human Factors, 41,* 61-71.

Swezey, R. W., Llaneras, R. E., Prince, C., & Salas, E. (1991). *Instructional strategy for aircrew coordination training*. Paper presented at the Sixth International Symposium on Aviation Psychology. Columbus, OH: Ohio State University.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4 th Ed.). Boston : Allyn & Bacon.

Takano, Y., & Noda, A. (1993). A temporary decline of thinking ability during foreign language processing. *Journal of Cross-Cultural Psychology, 24*(4), 445-462.

Triandis, H. C. (1995). *Individualism and collectivism*. Boulder, CO: Westview Press.

Wagner, W. (1996). Queries about social representation and construction. *Journal for the Theory of Social Behaviour, 26,* 95-120.

Weaver, J. L., Bowers, C. A., Salas, E., & Cannon-Bowers, J. A. (1995). Networked simulations: New paradigms for team performance research. *Behavior Research Methods, Instruments and Computers, 27,* 12-24.

Wiener, E. F. (1990). *Control of crew-caused accidents: The sequel.* Paper presented at the Boeing Flight Operational Regional Safety Seminar, New Orleans.

Witkin, H. A. (1950). Individual differences in ease of perception of embedded figures. *Journal of Personality, 19,* 1-15.

Witkin, H. A., & Berry, J. W. (1975). Psychological differentiation in cross-cultural perspective. *Journal of Cross-Cultural Psychology, 6,* 4-87.

Witkin, H. A., Dyk, R. B., Paterson, H. F., Goodenough, D. R., & Karp, S. (1962). *Psychological differentiation*. New York: Wiley.

Witkin, H. A., Goodneough, D. R., & Oltman, P. (1979). Psychological differentiation: Current status. *Journal of Personality and Social Psychology, 37,* 1127-1145.

APPENDIX A: *Demographic Questionnaire*

1. Subject Number:
2. What is your country of origin? United States China
3. What is your age? _____
4. Is English your native language? Yes No
5. How long have you lived in the United States

   Number of years ________ Number of months ________
6. How long have you spoken English

   Number of years ________ Number of months ________
7. Please list your Test of English as a Foreign Language (TOEFL) scores
   a. Listening (Section 1) ________
   b. Structure and Grammar (Section 2) ________
   c. Reading Comprehension (Section 3) ________
   d. Writing _______
   e. Total TOEFL score ________
8. In what year did you take the TOEFL? ________
9. How many siblings (brothers and/or sisters) do you have? ________
10. Which of the following best describes the environment in which you were raised?
    a. Urban
    b. Rural
    c. Suburban
11. What is your program of study in school? ______________________________
12. What is your current year in school?
    a. 1st year undergraduate
    b. 2nd year undergraduate
    c. 3rd year undergraduate
    d. 4th year undergraduate
    e. 1st year graduate
    f. 2nd year graduate
    g. 3rd year graduate

APPENDIX A
Continued

h. 4^{th} year graduate
i. 5^{th} year graduate
j. Other

13. IF YOU CHECKED "OTHER" IN QUESTION 12 ABOVE, PLEASE SPECIFY:

____

14. With whom are you currently living?
    a. Spouse (husband or wife)
    b. Significant Other (boyfriend or girlfriend)
    c. Roommate
    d. Family Member
    e. No one/ live alone
15. How many roommates have you had over the past 2-3 years? __________
16. How long have you been driving a motor vehicle? ___________
17. Have you ever had experience in flying a flight simulator? Yes No
18. Circle below any of these groups/teams you have been a part of in the past or are currently involved with:
    a. Competitive team sports
    b. Recreational team sports
    c. Social organizations (for example, Boy Scouts, Kiwanis, fraternity)
    d. Professional clubs
    e. Religious organizations
    f. Special interest organizations
    g. Academic group projects
    h. Team tasks or activities in the workplace
    i. Military
    j. Musical group (for example, a choir or band)
    k. Theatrical or dance group
    l. Research team
    m. Production team

APPENDIX A
Continued

n. Support group
o. Classroom team
p. Community action team
q. Manufacturing/assembly team
r. Advisory council
s. Student government association
t. Maintenance crew
u. Focus group
v. Task force
w. Management team
x. Government team
y. Review panel/board
z. Planning commission

APPENDIX B: Trainer Script

1. **Introduction**

2. **Purpose of training**: You will be participating in a research study on team behavior and culture. We will be assessing team behaviors while you are engaged in flying tasks. The purpose of this training is to acquaint you with the fundamental concepts and maneuvers needed to perform the assigned flying tasks. Once you have practiced the techniques learned in training by making several flights from Norfolk International to Richmond International, you will take a proficiency test to insure mastery of these skills.

3. **Briefly explain the four forces of flight**:
   Lift is the force that makes an airplane fly. Most of the lift comes from the airplane's wings.
   Weight is the gravitational pull on the airplane. It opposes lift.
   Thrust is the amount of "power" the airplane has at a given moment.
   Drag is the wind resistance encountered by the plane. It comes from friction between the air and the aircraft's structure and from wind moving from the high pressure area below the wings to the low pressure area above the wings. Drag is opposed by thrust.

4. **Introduce flight instruments. (Bring up instrument panel on computer screen and point out each one in turn.)**
   a. Altimeter: (upper right) measures the aircraft's altitude. The long needle points to the hundreds of feet. The short needle points to thousands of feet. Before takeoff, look at altimeter reading. It will indicate the elevation of the airport (not necessarily 0). This is important for landing (as will be discussed later).
   b. Airspeed Indicator: (upper left) shows the speed of the wind blowing on your airplane, which is not necessarily the same as how fast your airplane is moving. It is read in knots (nautical miles per hour).
   c. Attitude Indicator: (upper middle) When the plane is level with the horizon the orange lines representing the wings will overlap with the intersection of the blue and white hemispheres. You can't always rely on visual information to determine the plane's position; it may appear you are level based on position of the physical horizon with the instrument panel, but the attitude indicator and/or altimeter may show you are ascending or descending. When climbing the orange lines should be between ¼ and ½. Above that the plane may stall. When ascending the lines will show up in the blue area. When descending, the orange lines will go into the black area. The triangles at the top of the display show degree of turn. The triangles represent 15, 30, and 45 degree turns, respectively.
   d. Turn Coordinator: (bottom left) This instrument also shows the degree of turn. When the plane is level, the wings will be positioned straight across the display. When turning, the wings will move in relation to the turn of the plane. The "2MIN" reading means that it will take the plane 2 minutes to make a 360-degree turn.

APPENDIX B
Continued

e. Heading Indicator: (bottom middle) This is like a compass that tells you in what direction your plane is headed. Add one zero to any number on the face to get the plane's heading. For example, 6 on the heading indicator is really 60-degrees (spoken as zero-six-zero). The numbers appear at 30-degree intervals. Between these numbers are 5- and 10- degree increments. To fly a specified heading, point the nose of the white airplane to the desired heading.
f. Vertical Speed Indicator: (bottom right) This shows rate of climb or descent. It can also be used to insure level flying when in straight and level flight. When the needle moves upward, it shows rate of climb in hundreds of feet per minute. When the needle moves downward, it shows rate of descent in hundreds of feet per minute. It is recommended that both climbs and descents do not exceed 1000ft/min. The recommended rate of descent for landing is 500-600 feet per minute. More on this later!
g. Yoke: This is the steering wheel-like control that moves the plane. Pushing in on the yoke will cause the plane to descend. Pulling back on the yoke will cause the plane to climb. Turning the yoke right or left will cause the plane to move right and left, respectively. Caution: the yoke is very sensitive!! It takes only a small amount of movement in the yoke to produce corresponding movement in the plane.
h. Throttle: This is the gray level located on top of the yoke. This determines the power output of the engine. When the throttle is pulled back toward you (demonstrate this) the throttle is in idle—the engine produces minimal power. When the throttle is pushed away from you (demonstrate this) the engine produces more power. Full throttle means that the throttle is pushed forward all the way.
i. Manifold Pressure Gauge: (Located to the left of the turn coordinator) This instrument measures thrust, or engine power. When in full throttle, manifold pressure will be high. Reducing the power to idle also reduces manifold pressure because the engine is producing less power.
***You must constantly check all of these instruments during the course of your flight!!**

5. **Takeoff—Discuss and demonstrate**
    a. Begin with brakes on (show subject how to apply brakes and disengage them).
    b. Bring up GPS.
    c. Move throttle to full position (remind subjects that manifold pressure will be high at this point).
    d. Disengage brakes.
    e. As the plane moves down the runway, it will tend to pull to one side due to the momentum of the front propeller. You must keep the plane in the center of the runway by steering with the yoke.

APPENDIX B
Continued

f. At 60 knots (point to airspeed indicator) begin takeoff by pulling back slightly on the yoke. Warn subjects that pulling back too much may cause the plane to stall., but more pressure may be necessary to "unstick" the plane from the runway. Thus, once in the air, it may be necessary to push in on the yoke slightly to avoid stalling but remain ascending.
g. You must watch the airspeed and attitude indicators carefully at takeoff. Try to climb between ½ and ¼ attitude. If, immediately after takeoff, the attitude is above ½, push in on yoke slightly to decrease angle of climb, but make sure you're still climbing. Do not climb at a rate of more than 1000 feet per minute as indicated on the vertical speed indicator.
h. Speed should be between 80 and 90 knots during a steady climb.

Have subjects attempt a takeoff.

6. **Stalls**
If the angle of climb is too steep, the plane's airspeed will decrease. Once the airspeed falls below 40 knots (below the green band on the airspeed indicator), an alarm sounds and a message reading "Stall" is displayed just above the right side of the instrument panel. **Demonstrate this.**

Recovering from a stall: Despite your instincts, do not pull back on the yoke. Instead push in on the yoke and increase throttle pressure until angle of climb decreases and airspeed increases. **Demonstrate this.**

Have subjects attempt takeoff again and/or recover from a stall.

7. **Straight and Level Flying:**
    a. This is a fundamental maneuver in which the plane's nose is pointed in one direction and the wings are parallel to the earth's horizon. In level flight, the airplane does not gain or lose altitude. You may have to make small, smooth corrections to altitude and/or steering to keep the plane level and on course.
    b. Once you have reached cruising altitude (6500 feet) reduce throttle to ½. Recommended speed for straight and level flying is between 90 and 110 knots.
    c. Check turn coordinator and attitude indicator to make sure wings are level/parallel.
    d. Check GPS and/or heading indicator to make sure you are on course.

APPENDIX B
Continued

e. Check vertical speed indicator, attitude indicator, and altimeter to make sure plane is neither gaining nor losing altitude. If plane is losing altitude, you can pull back slightly on the yoke to regain altitude. An alternative is to use the trim wheel located to the left of the yoke (**show this**). The trim wheel allows you to make minor corrections in altitude after letting go of the yoke. It is used to relieve yoke pressure. Rotate the trim wheel downward to increase altitude. If the plane is gaining altitude, rotate the trim wheel upward to decrease altitude. The instrument panel should be parallel with the earth's horizon.
f. Watch your airspeed! If it begins to drop, increase throttle pressure slightly. If it begins to exceed 110 knots, decrease throttle slightly.

Demonstrate this and have subjects practice straight and level flying.

8. Turns

The position of the runway at Norfolk International from which you take off requires that you make at 90-degree turn to the left soon after takeoff in order to stay on the GPS course. Make this turn at about 1500 feet.

How to turn:

a. Move the yoke slightly to the right or left to enter a turn.
b. Monitor the angle of the turn by watching the turn coordinator and the triangles atop the attitude indicator. Try not to exceed a 45-degree turn.
c. You may find that as you turn, the altitude increases slightly, and then begins to decrease. Keep an eye on your altitude at all times. If altitude drops, pull back on the yoke slightly to reestablish altitude. Alternatively, you can increase throttle pressure to regain altitude or decrease throttle pressure to decrease altitude.
d. While in a turn the plane develops a certain amount of momentum. You will find that when you turn the yoke back to center to stop the turn, the plane will continue moving in the direction of the turn. Therefore, you must stop turning by returning the yoke back to its center position a few seconds **before** have reached your desired location.
e. In cases where you must ascend while turning (as with takeoff from Norfolk International Airport), follow the above instructions, but also maintain between ½ and ¼ attitude (as indicated by the attitude indicator) by pulling back slightly on the yoke while simultaneously turning it.
f. Watch your airspeed! If it begins to drop, increase throttle pressure slightly. If it begins to exceed 110 knots, decrease throttle slightly. Alternatively, you can use the yoke to adjust airspeed—pulling back on the yoke will decrease airspeed while pushing in on the yoke will increase airspeed.

Demonstrate this. Have subjects practice turns.

APPENDIX B
Continued

9. **Descents and Landing**
    a. In order to descend you must push forward on the yoke. It is recommended that the rate of descent for the Cessna is between 500 and 600 feet per minute as indicated by the vertical speed indicator. In order to reduce rate of descent, decrease forward pressure on the yoke and/or increase throttle.
    b. **Landing is probably the hardest maneuver to master! Encourage subjects to be patient with this.**
    c. On the flight from Norfolk to Richmond, begin descending about 30 miles before the airport. About 10 miles before the airport your altitude should be approximately 2500 feet. Begin looking for the runway. This takes practice!
    d. At about 2500 feet, apply 10 degrees flaps (use red buttons on the left side of the yoke). By applying flaps, you will slow the plane in preparation for landing. . When flaps are applied, the plane will tend to pitch up. Make adjustments by pushing the yoke forward. Keep an eye on the runway and steer toward it. Reduce throttle so that airspeed measures 75 knots
    e. At about 1880-2000 feet, apply 20 degrees flaps. Again, make corrections for pitch up. Try to align the plane with the end of the runway. Reduce throttle so that airspeed measure 65 knots.
    f. At about 1200-1500 feet apply full flaps. Correct for pitch up. Make small, smooth corrections to the plane to maintain alignment with the end of the runway. Airspeed should be about 65 knots. Reduce throttle if necessary.
    g. This is called the final approach. Continue descending at a rate of 500-600 feet per minute. At about 1000 feet, apply 14-degree pitch in order to raise the nose higher than the rest of the plane. You want the plane to land on the back two gears first then on the nose gear. Reduce throttle to idle. Pull back on yoke slightly to avoid slamming into the ground. Continue descent until plane touches runway. Apply brakes.

Demonstrate this and have subjects practice landing. There are tutorials that focus exclusively on landing.

Lesson #2: This is a good tutorial to get subjects acquainted with the angle and rate of descent as well as the more procedural aspects of landing (applying flaps, etc.). The red and white lights beside the runway tell the pilot if he/she is too high or too low. Rod will talk the pilot through the landing procedure. Scenario begins with the plane lined up with the runway at about 2500 MSL. Airport elevation is about 766 MSL.

Tutorial 7, Situation 1: Plane is lined up with runway. Starting altitude is approximately 3,860 MSL. Airport is located at 3,000 MSL. Pilot must descend about 860 MSL in order to complete the landing.

APPENDIX B
Continued

Tutorial 7, Situation 2: Plane is lined up with runway, but is too low in preparation for landing. Starting altitude is approximately 3, 480 MSL. Airport is located at 3,000 MSL. Pilot may want to throttle up in order to prepare for landing, or pilot may want to "hold" at starting altitude until plane gets closer to the runway.

Tutorial 7, Situation 3: Plane is lined up with the runway, but is too high in preparation for landing. Starting altitude is approximately 4, 660 MSL. Airport is located at 3,000 MSL. Pilot must descend rather quickly (approximately 1,660 MSL) in order to touch down on the runway.

10. Flight Patterns (It may help to draw a diagram to explain this)
    a. The departure leg is when you take off. You will climb here.
    b. The crosswind leg is when you make a 90-degree turn to the left when you reach an altitude of 1000-1500 feet. You will continue to climb here.
    c. The downwind leg is when you make another 90-degree left turn. You will be parallel with the runway you just left, but going in the opposite direction. You will reach cruising altitude here. You may also begin descending toward the end of the downwind leg in order to prepare for landing.
    d. The base leg is when you make another 90-degree turn to the left in order to line up with the runway. You may make your descent here in preparation for landing.

There is a tutorial (Tutorial 8, Situation 1) on flying flight patterns that may be useful for subjects to practice this maneuver.

11. Navigation:

GPS: (Global Positioning System) This is a system of satellites that tracks position and velocity of the plane.

Show subjects how to bring it up on screen:

a. Click on Views
b. Select Instrument Panel
c. Select GPS

Discuss with subjects tracking and bearing numbers: The bearing number indicates position of the airport, not necessarily the actual runway. The tracking number indicates the plane's position. You want the bearing and tracking numbers to be equal or as close as possible. The path you want to take is indicated in green. The path that you are actually traveling appears in yellow. Keep in mind that just because the bearing and tracking numbers are close or identical, the runway may not be right in front of you as you prepare to land. You must look for the runway around you. The gray hat switch located on the right side of the yoke can be moved from side to side to aid in looking for the runway. **Demonstrate this.**

APPENDIX B
Continued

Show subjects the GPS receiver buttons: MODE (consists of 3 primary navigation screens—Map, Waypoint Info, and Route Info); DIRECT TO (the "D" with an arrow through it that toggles the display between the DIRECT TO and the Emergency screens); MENU (options for displaying info on screen); ENTER (enters changes); and CANCEL (cancels changes)

Discuss what waypoint means

MAP SCREEN: Presents a moving map display to obtain navigational information while flying. The route displayed is either to waypoints in the flight plan created in Flight Planner, or to a waypoint chosen in the DIRECT TO or Emergency screens. At the top of the screen is the identifier of the next waypoint, the distance and magnetic bearing to it, airspeed, path of plane (track) and cross-track error in nautical miles. In the center of the map is an aircraft icon. The approximate distance from the aircraft icon to the top of the screen is displayed in the lower right corner. The level of zoom can be changed by clicking the up and down arrow buttons at the top of the GPS receiver. Scattered across the map are airports, navigational aids, and navigational information specific to the flight planned. **Demonstrate this.**

WAYPOINT INFO SCREEN: Gives info about the next waypoint. The screen shows the name of the next waypoint, distance to it from present location, groundspeed, the plane's heading (track), magnetic bearing to the waypoint, estimated time en route based on current groundspeed, estimated time of arrival at the waypoint based on current groundspeed, and current latitude and longitude. **Demonstrate this.**

ROUTE INFO SCREEN: Provides info about the entire planned route at a glance. There is a list of all waypoints as well as the magnetic bearing and distance from one waypoint to another. Click the Up and Down arrows to highlight different waypoints. Once a waypoint is highlighted, that waypoint's latitude and longitude, and estimated en route and arrival times based on current groundspeed are displayed below the list of waypoints. **Demonstrate this.**

DIRECT TO SCREEN: Allows you to abandon a flight plan and fly directly to any airport, navigational aid, or intersection you choose. Scroll through the available facility types by clicking the Left and Right arrow buttons, then click the Down arrow button to highlight a facility identifier. Click the Left and Right arrow buttons to highlight a facility of that type. When selected, a facility's name and coordinates are displayed, as well as distance and magnetic bearing to it from your current position. Click Enter button to enter the selected facility into the GPS as the next waypoint. **Be sure to give the following warning:** Once you click the Enter button, any waypoints from a loaded flight plan will be replaced with the DIRECT TO waypoint you've

APPENDIX B
Continued

selected. Click CANCEL before pressing Enter to go back to the original waypoints before you went to the DIRECT TO screen. **Demonstrate this.**

EMERGENCY SCREEN: Allows you to abandon a flight plan and fly to the closest airport in an emergency. A list of airports closest to your current position is displayed, along with the magnetic bearing and distance to each. Use the Up and Down arrow buttons to scroll through the list of available airports. The highlighted airport's coordinates are displayed at the bottom of the screen. Click the Enter button to enter the selected airport into GPS as the next waypoint. **Be sure to give the following warning:** Once you click the Enter button, any waypoints from a loaded flight will be replaced with the Emergency waypoint you've selected. Click CANCEL before pressing Enter to go back to the original waypoints before you went to the EMERGENCY screen. **Demonstrate this.**

MENU SCREEN: Enables you to change what information is displayed on the MAP SCREEN, as well as the orientation of the map. Use the Up and Down arrows to scroll through the list of display options, then click the Left or Right arrow buttons to toggle each item on or off. Orientation options include North Up, Track Up, and Desired Up. Click the Enter button to make changes and return to the MAP SCREEN, or the CANCEL button to return to the MAP SCREEN without making any changes.
Demonstrate this.

Heading Indicator: This can be used as a compass in order to make specified changes in direction that the subjects must accomplish in the proficiency test. Remind subjects where 90-, 180-, 270-, and 360-degrees are located on the heading indicator. Stress that there is no magnetic north on the heading indicator. Subjects must remember **from** what direction they have flown and **to** what direction they are flying.

12. Bad Weather:

Remind subjects of the importance of the pre-flight briefing in addition to any ATC briefings while in-flight.
Stress to subjects that they are flying under **visual flight rules**. This means that they are not to fly in adverse weather conditions!! If they are caught in a "surprise" storm, they are advised to turn around (a 180-degree turn) or fly to an alternate location.

If you encounter adverse weather during your flight, consider the following:

1. Do your best to keep the plane level. **Watch the attitude indicator closely!!** Keeping the plane level is the best way to keep airspeed and G-forces to a minimum.

APPENDIX B
Continued

2. Don't be as concerned with assigned altitude as you would be in fair weather conditions. Just keep the plane level with the horizon and make sure the wings are level (check the turn coordinator).
3. Do not extend the flaps!! In turbulence, flaps can create more problems such as G-force damage.
4. Maintain your heading. Turning around (180-degree turn) could be disastrous. Often the quickest way out of a storm is to just to forge ahead. However, if course corrections are deemed necessary, make heading changes slowly and with minimal bank angles (No steep turns!).
5. Stay calm.
6. If you discover that airspeed is decreasing, the altitude is probably increasing. Use the attitude indicator to bring the nose of the plane back to the horizon, level the wings, and increase power to prevent a stall.

Have students practice flying in bad weather.

13. Flight Computer
Show students the flight computer.

1. Points to keep in mind:
    a. the number "60" (with the arrow) on the rotating disk is used in virtually all calculations measured as something per hour (e.g., gallons per hour or miles per hour)—this is the **rate arrow**
    b. the minutes scale is on the middle scale and the hours scale is on the inner scale
    c. **speed, distance, and fuel** are always measured using the **outer** scale
    d. the numbers on the outside scale can be read as multiples of 10 (e.g., 1.0, 1, 10, 100, 1000, etc., **depending on the context of the problem.** Use common sense!!
2. To calculate the length of time to travel a known distance with a certain ground speed:
    a. determine ground speed and distance from GPS
    b. turn the outer wheel so that the rate arrow points directly at the ground speed
    c. look for the distance on the outer scale
    d. look directly opposite to the distance value on the inner or middle scale to find the time (**Use common sense here. Whether you use the inner or outer scale depends on the context of the problem.)**
3. To calculate fuel needed for flight:
    a. line up rate arrow with the GPH value (as indicated on the instrument panel) on the outer scale
    b. using the time value calculated in step #2, find that same number on the inner or middle scale

APPENDIX B
Continued

c. the number directly across from the time value will be the amount of fuel burned **(again, consider the context of the problem to determine what multiple of ten the value on the outer scale will assume—e.g., 1.6 versus 16 gallons)**

14. Pilot and Copilot Responsibilities

For the actual experiment, subjects will be randomly assigned to roles of either pilot or copilot. Regardless of which role subjects are assigned, it is important that all participants of this study be proficient in the above maneuvers. Below is a list of responsibilities expected of pilots and copilots, respectively. This list, however, is not intended to be exhaustive. Sometimes the situation demands flexibility in role responsibilities. For example, the copilot may need to assist the pilot in applying flaps in preparation for landing. However, this situational-specific dynamic will need to be established between the pilot and copilot once engaged in the flying task—hence, our study.

Captain/Pilot Duties:

A. Fly the airplane—responsible for monitoring and maintaining altitude, attitude, and airspeed within the designated tolerances
B. Insuring safety of the mission
C. Insuring completion of the mission
D. Insuring the performance of the machine and crew

Navigator/Copilot Duties:

A. Monitoring progress of route
B. Monitoring communications from ATC
C. Monitoring weather along flight path and to destination
D. Monitoring aircraft instruments and status
E. Operate landing gear

15. Phonetic Alphabet

Air traffic controllers use the phonetic alphabet in order to avoid confusing certain letters (e.g., mistaking an "F" for an "S") while conveying directional information. Each letter of the English alphabet is communicated by substituting an entire word that begins with that letter. For example, the word "Alpha" is used to designate the letter "A". Below is a list of all the members of the phonetic alphabet with their associated single letter counterparts.

Numbers also have a customary notation in ATC lingo. Below are examples of how numbers would be read aloud in an ATC transmission.

APPENDIX B
Continued

16. ATC Communication

Allow subjects to gain familiarity with ATC by having them listen to a mock ATC tape. The purpose of ATC, at least for this experiment, is to communicate at regular intervals to the flightcrew information vital to the successful completion of the flight, including weather conditions. Subjects should be advised of all possible weather conditions. Below is a list of the ranges for clouds, precipitation, visibility, and wind strength, from least to most intense:

a. Clouds: clear, few, scattered, broken, overcast, thunderstorm
b. Precipitation: none, very low, low, moderate, high, very high
c. Visibility: 1/16, 1/8, ¼, ½, ¾, 1, 2, 3, 4, 5, 10, 20, etc.
d. Wind Strength: none, light, moderate, heavy, severe

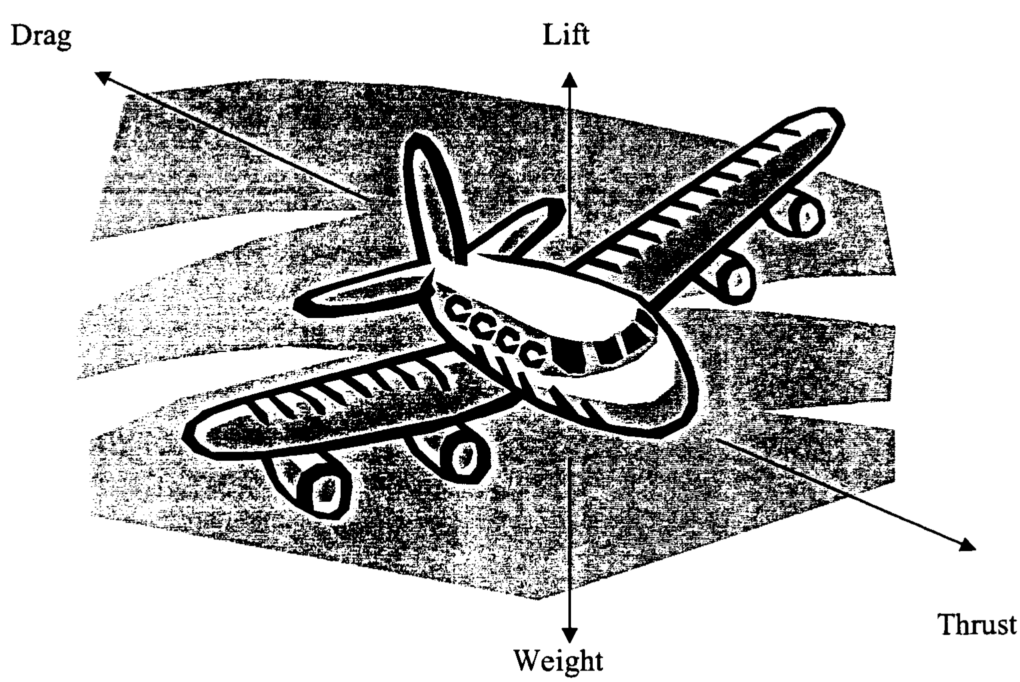
APPENDIX C: *Flight Training Manual*

Table of Contents

Flight Training Plan

This portion of the training consists of the basic vocabulary and concepts necessary to fly, as well as how to perform each task using Microsoft Flight Simulator

The Four Forces of Flight



APPENDIX C
Continued

There are four forces that affect flight: Lift, weight, thrust, and drag. These four forces act in pairs. Lift (the sum of all upward forces) opposes weight (the sum of all downward forces), and thrust opposes drag. The opposing forces balance one another in steady-state flight including straight-and-level flight, constant-rate climbs or descents at a steady airspeed.

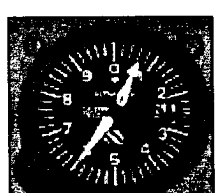
1) Lift: is the force that makes an airplane fly. Most of an airplane's lift comes from its wings. You control the amount of lift a wing creates by adjusting airspeed and angle of attack (AOA - The angle between the wing and the oncoming airflow - the angle of attack is related to the direction in which an aircraft is moving, not to the angle the wing makes with the horizon). In general, as angle of attack increases, so does the amount of lift a wing produces As the airplane slows down, you must increase the angle of attack by raising the nose slightly to generate more lift and maintain altitude.

2) Weight: weight opposes lift. As a practical matter, you can assume that weight always acts along a line from the airplane's center of gravity to the center of the earth. To maintain the balance between lift and weight during maneuvers, you must adjust the angle of attack. During a steeply banked turn, for example, you must raise the nose slightly by increasing the angle of attack to produce more lift and thus balance the increased weight.

3) Thrust: is opposed by drag, and in steady-state flight thrust and drag are equal. If you increase thrust and maintain altitude, thrust momentarily exceeds drag, and the airplane accelerates. Drag increases, too, however, and soon drag once again balances thrust. Thrust is also the most important factor in determining your airplane's ability to climb.

4) Two kinds of drag affect an airplane. Parasite drag is friction between the air and an aircraft's structure, landing gear, for example. Induced drag is a byproduct of lift. It is caused by air moving from the high-pressure area below a wing into the low-pressure area above the wing.

Six Main Flight Instruments and Other Necessary Controls

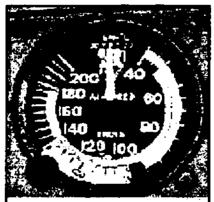


Gauge3 (1).jpg

1. Altimeter: (upper right) the altimeter measures air pressure. It's calibrated to display that air pressure as height, usually in feet above mean sea level(MSL). The air pressure inside the instrument case decreases as the airplane climbs and increases as it descends. Most small aircraft are equipped with two-needle altimeters. The long needle points to hundreds of feet. The short needle points to thousands of feet. To

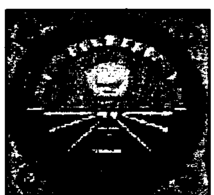
APPENDIX C
Continued

display altitude accurately, the altimeter must be set to the current barometric pressure adjusted to sea-level pressure. **When properly set the altimeter indicates the airport elevation-not zero- before the airplane takes off.** The current altimeter setting can be found from ATIS, air traffic controllers, and flight service stations.



Gauge1.jpg

2. Airspeed indicator: (upper left) At a certain power setting for a certain attitude, a plane will move through the air at a certain rate, this rate being measured by the airspeed indicator. The airspeed indicator shows the speed of the wind blowing on your airplane, which is not necessarily the same thing as how fast your airplane is moving. It's calibrated to read in knots (or nautical miles per hour).


Gauge2 (1).jpg

3. Attitude indicator: (upper middle) is the face with a white horizon line and other reference lines on it. When the instrument is operating correctly, this line will always represent the actual horizon. A miniature airplane, attached to the case, moves with respect to this artificial horizon precisely as the real airplane moves with respect to

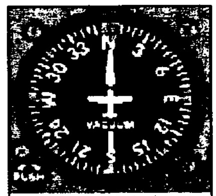
Gauge4 (1).jpg

the real horizon.

4. Turn coordinator: (bottom left) Notice the ball located in the curved glass tube. The combination is called the inclinometer. When the ball is in the bottom center of the tube, the airplane's nose is perfectly pointed in the direction of turn. If the ball is deflected to the right/left of center, add a little right/left rudder to center it. The inclinometer is one way to tell if the airplane's nose is pointed precisely in the direction of turn. The "2 MIN" indicates that if the wing of the miniature airplane is

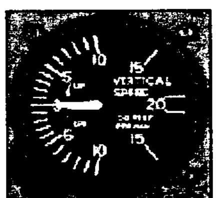
APPENDIX C
Continued

placed on the reference mark, it will take 2 minutes to complete a 360-degree turn(3 degree per second).



Gauge5 (1).jpg

5. Heading indicator (bottom middle): Sometimes called a directional gyro. Think of the heading indicator as a mechanical compass that shows which way your airplane points. Add a single zero to any number on the face to get the airplane's actual heading. In other words, 6 is really a heading of 0 degrees (spoken as zero-six-zero degrees). 33 is really 330 degrees. The numbers appear at 30-degree intervals. Between these numbers are 5- and 10- degree increments. To fly a specified heading, turn the airplane until the nose of the white airplane points to the desired heading.



Gauge6 (1).jpg

6. Vertical speed indicator: (bottom right) This is an instrument that is useful in maintaining a constant rate of climb or glide. When its needle deflects upward (above zero), it shows a rate of climb. It shows a rate of descent as its needle deflects downward (below zero). If the needle indicates zero, then the plane is in level flight.

1) Yoke: The steering-wheel-like control that is connected to the ailerons and elevator. A pilot turns the yoke to move the ailerons and bank the wings. The pilot moves the yoke forward and back to move the elevator, which lowers and raises the nose. Some airplanes have a stick or "joystick" instead of a control yoke.

2) Throttle: The cockpit control that most directly determines the power output of the engine. In a piston engine, the throttle actually controls the amount of air entering the carburetor or induction system. The carburetor or fuel metering system mixes the appropriate amount of fuel with the air to create a combustible mixture. When fully "open" the throttle allows the maximum amount of air to enter the system to produce maximum power. When the throttle is "closed," only a small amount of air enters the system and the engine produces minimum power.

APPENDIX C
Continued

3) Manifold Pressure Gauge (MP Gauge): An instrument that measures the air pressure in the intake manifold of a piston engine. Means of measuring thrust – the engine's power meter. Applying full throttle gives you more manifold pressure, which means the engine's producing more power (thrust). Reducing the power to idle gives you less manifold pressure, which means the engine's producing less power. Calibrations range from a low of 10 inches to a high of 22 inches.
   Full throttle = move throttle all the way forward
   Flight idle = pull throttle all the way back

Takeoff
Basic Concepts:
- On takeoff, your objective is to accelerate the airplane to a sufficient speed where you can raise the nose to climb attitude (known as rotating). Recommend rotating at least 5 knots above the airplane's no-flap stalling speed (which is 50 knots – the beginning of the airspeed indicator's green arc). When the airspeed indicator shows 55 knots, raise the nose to the attitude that results in an 80-knot climb. It takes little extra initial backpressure on the joystick to unstick the airplane from the runway during rotation.

How to: *Prepare for takeoff*
- Resting at the end of the runway at Norfolk International
- Brakes on.
- No throttle.
- Flaps up.
- Display GPS. (On the Views menu, point to Instrument Panel, then click GPS)
    - GPS – Global Positioning System
- Check instruments.
- Complete kneeboard checklist for take-off

How to: Taxi toward take-off
- Brakes on.
- Full throttle.
- Brakes off.
- Steer straight ahead.
- At 60 knots begin take-off.
- Pull back slightly (softly) on yoke.
- Maintain level plane position (unless turning is required).
- Check instruments.

APPENDIX C
Continued

***How to:** Ascend after takeoff*
- Climb between ¼ and ½ attitude.
- Speed will increase to 90 knots during steady climb.
- If your climb is any steeper than ½ attitude, your plane will stall.
- Maintain ½ attitude and 90 knots until your plane reaches its cruising altitude.
- At cruising altitude, pull back throttle to ½, this will slow your plane down to its cruising speed at cruising altitude.
- Maintain level plane position.
- Check instruments.

Straight and Level Flying

Basic concepts:

- It is one of aviation's most fundamental maneuvers. Straight flight means the airplanes' nose remains pointed in one direction and the wings are parallel to the earth 's horizon. Level flight means the airplane doesn't gain or lose altitude. Like a balancing act, straight –and –level flight requires that you make smooth, small corrections to keep the airplane from wobbling all over the sky.
  - Holding a constant altitude and airspeed. This part requires that the pairs of opposing forces remain balanced.
  - Holding a constant heading. This part requires you to monitor the heading indicator and turn coordinator to hold the wings level.

- Trim control: It helps you to maintain a specific control position so that the airplane stays at a particular speed or attitude without making you hold constant pressure on the controls (Similar to Cruise Control in a car). Trim tabs are on elevator, rudder and ailerons. In this training we will only use elevator trim while flying.
  - The trim compensates for the changing force created by the flow of air over the elevator. When the airplane is properly trimmed for level-cruising flight, you can fly "hands off".
  - When you add power, the nose tends to rise. You must apply forward pressure on the yoke, which is hard. Instead, you can apply down (rotate downward) trim until the pressure disappears. When reduce power, apply up elevator trim. (rotate upward)
  - Use the trim only to relieve control pressure. Use power and yoke to change pitch attitude, and then adjust the trim after the airplane stabilizes

How to: Establish and maintain straight-and-level flight

- **Establish a specific pitch attitude by pushing or pulling the yoke**
- **Set power at a constant level by pushing or pulling the throttle**
- **Keep the airplane on the attitude indicator level with the horizon**
- **Put yoke in its center position**
- **Check the vertical speed indicator, make sure the needle stops moving**

APPENDIX C
Continued

- **Look over the instrument panel out the windscreen (front window) to make sure the top portion of the instrument panel is approximately parallel with the distant horizon.**
- Make small smooth corrections to the pitch attitude and adjust the trim when the airplane starts to gain or lose altitude
- Trim Up Number Pad 7
- Trim Down Number Pad 1
- **Check the heading indicator frequently to make sure the nose stays pointed in the right direction**
- **Adjust the trim of the plane properly and leave it alone**
- **Cross-check the turn coordinator to make sure the wings on the miniature airplane are level**

Turns

Basic concept:

- An airplane turns some of the lift that the wings produce push it around the corner. Banking the wings with ailerons (movable control surfaces that control the rolling motion of an action) deflects sideways some of the lift that the wings produce. This part of the airplane's total lift is called the horizontal component of lift. It is this force that pushes an airplane around in a turn.
- Adverse yaw: Banking (the angle of an airplane's wings with respect to horizon) the wings changes the angle of attack of each wing. This deflection of ailerons changes the drag of each wing. These two factors create a tendency for the airplane to yaw (movement of an aircraft about its vertical axis, as when the nose turns left or right) opposite the turn. That is if you bank to the left, the airplane's nose tends to swing toward the right.
- When the wings of the miniature airplane align with small lines next to the L and R, the aircraft is making a standard rate turn, which means the plane completes a 360 degree turn in two minutes.
  - Maintain altitude and airspeed when you are turning

How to: Turn

- Move the yoke slowly to the left/right in a bank turn of a certain degree, once the airplane is established in the bank, return the yoke to its neutral or center position.
- Pull the yoke to add a little up elevator pressures to increase the angle of attack as you roll into a turn.
- Increase pitch and add power to make a steep turn (45 degree or more)
- Relax the back pressure on the yoke as you roll out of the turn – check the turn coordinator and attitude indicator to determine if you've resumed straight and level flight
- Check the turn coordinator to maintain the rate of turn and the quality of the turn(by looking at the ball in a tube)

APPENDIX C
Continued

- The turn coordinator is usually electrically powered so that its available if the vacuum pump fails
- Attitude indicator shows degree of bank
- Use Heading Indicator to show direction

How to: *Ascend with turn*
- After take-off, turn the plane (left or right, e.g., 30 degrees) with the yoke, to the desired direction, as instructed by the GPS and turn coordinator.
- Maintain between ½ and ¼ attitude throughout your turn, you are still climbing.
- Once you have attained the proper flight direction (GPS will be your guide), keep yoke steady and remain climbing. The turn coordinator will let you know if your plane is steady.
- Once you have reached cruising altitude, position throttle at 1/2, return to level plane position, and attitude level with horizon

Slow Flight
***Basic Concepts*:**
- An increase in the speed of wind over a surface reduces the pressure on that surface. In an airplane, there exists high pressure under the wing and low pressure over the wing. A high pressure will always want to move toward a low pressure – this produces the effect of lift on the wing, which allows the plane to fly. At a cruise speed of 110 knots, the wing's shape produces enough lift to counterbalance the weight. With less power, at the same angle, the plane will fly slower, causing a decrease in lift, which in turn causes a loss of altitude. Therefore, you must increase the angle of attack (the angle of the wings) by raising the plane's pitch to maintain altitude at slower speeds.

How to: Enter slow flight
- Reduce power
- Raise nose (8-degrees)
- When airplane reaches desired speed, apply enough power to hold altitude

How to: *Leave* slow flight

- Increase power
- Lower nose

Stalls
***Basic Concept*:**
- When the angle of attack has increased too much, the airflow over the wings becomes disrupted too much to develop sufficient lift for flight (Not good!)

APPENDIX C
Continued

How to: *Recover from a stall*:
- Lower the nose (despite your instincts, don't continue to pull back on the yoke)
- Increase power

Climbs and Descents

Basic Concept: Climbs

- The throttle determines how much power the engine can develop by controlling the amount of fuel and air entering the engine cylinders. When fully "open," the throttle allows the maximum amount of fuel and air to enter the system to produce maximum power. When the throttle is "closed," only a small amount of fuel and air can enter the system, and the engine produces minimum power. To open the throttle, push the control in. To close it, pull it out. The manifold pressure (MP) gauge on the instrument panel shows the pressure of the air moving into the engine's cylinders, and gives an approximate measurement of engine power. Generally speaking, the higher the manifold pressure, the more power you have.
- Climbs: An airplane climbs when its engine or engines produce more power (thrust) than is required to maintain level flight at a particular weight and angle of attack. Airplanes do not climb because the wings generate more lift. This point may seem confusing, but it makes sense if you remember that whenever an airplane is in steady-state flight—for example, a climb at a constant airspeed and rate—lift equals weight. If lift exceeded weight during a climb, an airplane would accelerate upward.
- A Steady Pull: During a steady-state climb, the component of lift acting vertically toward the ground is actually slightly less than weight, because when the airplane is in a climb attitude, some of the lift vector is directed rearward, not upward. So a climb is caused by the thrust vector pulling the airplane up at an angle. Imagine someone tugging a sled up a hill, and you'll get the general idea.
- More Power: **If power determines rate of climb, then it's apparent that the throttle, not the control yoke, is the primary "up-down" control in an airplane**. Pulling back on the yoke to increase an airplane's pitch attitude usually does start a climb. But an increase in induced drag quickly counteracts the boost in lift, and the airplane, having gained a little altitude, settles into level flight at a lower airspeed or into a slow, constant-rate climb. To establish and maintain a steady rate of climb, excess thrust must be available, and you must add power.

How to: *Begin a climb*
- Raise nose to 13-degree pitch
- Add full throttle
- Apply nose-down trim as needed to maintain constant attitude
- Watch airspeed and rate of climb
- 80-knot climb speed is best for the Cessna – pitch up to slow down while still using max thrust

APPENDIX C
Continued

How to: *Turn and Climb*

- Bank into turn
- Increase pitch – adjust to 80-knots
- When within 50 feet of new altitude, lower nose and roll out of turn
- Reduce power to 20mp – Pull throttle to lower power until MP Gauge reads 20 mp

Basic Concept: Descents

- Descents: Many people assume that to descend you simply push forward on the control yoke or stick to point the airplane's nose down. In fact, the pilot must adjust both pitch and power to establish a stable descent at a constant airspeed. You can descend with the airplane in a level or even nose-up attitude. Remember that if you hold an airplane's pitch attitude constant, thrust—power—determines whether the airplane maintains altitude, climbs, or descends. If the engine produces more thrust than is required to maintain level flight, the airplane climbs. It descends if you reduce power. As a rule of thumb, limit descents in unpressurized airplanes to about 500 ft/min (152 m/min). This rate allows passenger's ears to adjust to pressure changes during the descent. Spend some time with the airplanes in Flight Simulator to familiarize yourself with the performance that you can expect at different power settings and airspeeds. Remember, the lower the power, the greater the rate of descent. Practice stopping a descent by smoothly adding power.
- Flight idle = throttle all the way back
- To change airspeed, adjust pitch
    - Climbing – make hill steeper to slow down
    - Descending – make hill steeper to speed up

How to: *To descend*

- Slowly reduce throttle
- Maintain a 3-degree pitch
- Trim as needed
- To change descent rate, change thrust – Increase in power = slower rate of descent

How to: *Turn and Descend*

- Bank into turn
- Reduce to flight idle
- Lower nose
- When within 50 feet of new altitude, lower nose and roll out
- Reduce power to 20mp

Landing
Basic Concepts:

- Speed = 65 knots for final approach

APPENDIX C
Continued

- The Cessna 182 is a tricycle gear plane. It has two main gear wheels in the back and a nose gear wheel in the front. The idea is to land on the two main gears first, and then lower the nose gently to the ground.
- You should give yourself a final approach length of 1 to 2 miles.
- Flaring: ensures soft, safe touchdown
- The landing flare begins about 10 to 20 feet above runway. Gradually reduce power. Raise nose with a slight and gentle pull on the yoke. You want to make the descent angle shallow and decrease airspeed for landing. Adjust pitch to 14 degrees. This makes the nose gear higher than the main gear. Let the plane settle onto the runway at this attitude. Once you've touched down, gently release yoke pressure to lower nose gear onto the runway. Then apply brakes.
- Flaps: used when the plane is high and we need to increase rate and angle of descent. Flaps allow the plane to descend steeply without an increase in airspeed

- Extend Flaps (in increments) F7
- Extend Flaps Fully F8
- Retract Flaps (in increments) F6
- Retract Flaps Fully F5

- General Tips: Make sure runway is always in view. When high enough for a normal glide to the runway, reduce power and begin descent. On final approach slowly reduce power to idle (using the throttle) and maintain 65 knots until touch down. It will *appear* that the plane will touch down before meeting the runway. The plane will actually land on the first one-third of the runway.
- Landings require a minimum visibility of ¼ mile.

Traffic Pattern – The approach and alignment with the runway:

- Five major segments to traffic pattern: departure leg, crosswind leg, downwind leg, base leg, and final approach
- **Departure**: when airspeed indicator shows 55 knots, raise nose to 11-degree pitch. Level out at 1000 feet, 90 to 95 knots, reduce MP to 16 in. and trim
- **Crosswind leg**: After takeoff, begin turn to crosswind leg when within 300 feet of traffic pattern altitude (1000 ft.) Make a 90-degree left turn
- **Downwind leg**: When just past runway, make another 90-degree turn and fly parallel to the runway.
- On the downwind leg, begin to prep for base leg/landing – apply 10-degree flaps (first, make sure speed is below 95 knots) – adjust the pitch to hold the altitude and trim
- Continue downwind until passing a point abeam (across from) the threshold of the landing runway
- **Base leg:** When the landing threshold appears about 45 degrees between the wing and the tail of the airplane, begin 90-degree turn to base leg
- Reduce power to flight idle

APPENDIX C
Continued

- Establish glide at 70 knots while on base leg and trim
- **Final Approach**: Continue on base leg until you can turn and align yourself with the runway centerline
- Once lined up on final approach, establish a speed of 65 knots or 20 to 30 degree flaps with 60 knots and trim
- Land!

How to: *Land*
- Apply gentle, constant forward pressure on yoke to descend.
- Keep wings level.
- Apply 10 degrees of flap (F7) and reduce throttle.
- Apply forward pressure on the yoke to correct for pitch up caused by the application of flaps and readjust pitch for final approach.
- Speed should be 65 knots. Reduce throttle if necessary to maintain this airspeed.
- Adjust trim.
- Apply 20 degrees of flaps.
- Make adjustments to pitch and trim as described above.
- Decrease speed to 60 knots.
- Apply full flaps.
- At flare height, raise nose from present attitude to about 14-degree nose up pitch. Hold attitude until touchdown.
- Apply brakes
- Adjustments:
  - If **too high**, circle the runway or fly in a zigzag pattern until the desired altitude for landing is reached.
  - If **too low**, add power via throttle and hold altitude until in a position for normal glide to the runway.

Navigation
GPS - Basic Concepts:
- The Global Positioning System (GPS) is a space-based radio navigation system initially developed and currently operated and maintained by the United States Department of Defense. It consists of 24 satellites and five ground stations that provide users with accurate information about their three-dimensional position and velocity, as well as the local time anywhere in the world and in all weather conditions. By taking a measurement from four satellites, the receiver can compute latitude, longitude, altitude, and local time. For pilots, GPS is just as accurate as the most accurate service being provided by VOR/DME navigation systems, and has the potential to become the main means of aerial navigation
- Every Flight Simulator 2000 aircraft includes a Global Positioning System (GPS) receiver that makes getting from here to there easier than you had imagined. The GPS receiver is your primary in-flight tool for viewing your progress along, and deviation

APPENDIX C
Continued

from, a previously loaded flight plan. It also displays, in simplified form, the information found in the Map View dialogue box (see Using Map View). The GPS receiver features a multi-page display screen, with buttons along the top.

How to: *Set up GPS*
- Click on the Views menu
- Point to Instrument Panel
- Click GPS

Using the GPS receiver buttons:
- The MODE button cycles between the three primary navigation screens: Map, Waypoint Info, and Route Info.
- The DIRECT TO button (a "D" with an arrow through it) toggles the display between the Direct To and Emergency screens.
- The MENU button brings up a list of options for how information is displayed on the Map screen.
- The four arrow buttons set the zoom level on the Map screen and cycle through and change options on other screens.
- The ENTER button enters changes.
- The CANCEL button cancels changes.

The Map Screen
- The Map screen presents a moving map display that you can use to obtain navigational information visually as you fly. The route displayed is either to waypoints in a flight plan you've created in the Flight Planner, or to a waypoint you've chosen on the Direct To or Emergency screens. At the top of the screen is the identifier of the next waypoint, the distance and magnetic bearing to it, your aircraft's groundspeed, your aircraft's track across the ground, and the cross-track error in nautical miles (left and right arrows point back to the desired track). In the center of the map is an aircraft icon that represents your aircraft. The approximate distance from the aircraft icon to the top of the screen is displayed in the lower-right corner of the display. The "level of zoom" can be changed by clicking the up and down arrow buttons at the top of the GPS receiver. Scattered across the map are airports, navigational aids, and navigational information specific to your flight. You can change what's displayed (as well as the orientation of the map) by clicking the Menu button (see "The Menu screen" below).

The Waypoint Info Screen
- The Waypoint Info screen gives you information about the next waypoint. The screen shows the name of the next waypoint, the distance to it from your present position, your groundspeed, your track (heading), the magnetic bearing to the waypoint (the heading you should fly in a no-wind situation), the estimated time en route based on your current groundspeed, the estimated time of arrival at the waypoint based on your current groundspeed, and your current latitude and longitude.

APPENDIX C
Continued

The Route Info Screen

- The Route Info screen provides information about your entire planned route at a glance. There is a list of all the waypoints, as well as the magnetic bearing and distance from one waypoint to another. Click the Up and Down arrow buttons to highlight the different waypoints. A highlighted waypoint's latitude and longitude, and the estimated en route and estimated arrival times for both that leg and the complete route (based on your current groundspeed), are displayed below the list of waypoints.

The Direct To Screen

- The Direct To screen makes it easy to abandon a flight plan and fly directly to any airport, navigational aid, or intersection you choose. Scroll through the available facility types by clicking the Left and Right arrow buttons, then click the Down arrow button to highlight a facility identifier. Click the Left and Right arrow buttons to scroll through all the available facilities of that type. Or, click the Down arrow once to highlight the first identifier letter, then use the Up and Down arrow buttons to change it. Click the Right arrow button to highlight the next letter of the identifier, and so forth. Using the arrow buttons in this manner, you can select any facility you want. When selected, a facility's name and coordinates are displayed, as well as the distance and magnetic bearing to it from your current position. Click the Enter button to enter the selected facility into the GPS as the next waypoint.
- **WARNING:** Once you click the Enter button, any waypoints from a loaded flight plan will be replaced with the Direct To waypoint you've selected! Click the Cancel button at any time before pressing Enter to revert to the waypoints that were loaded before you went to the Direct To screen.

The Emergency Screen

- The Emergency screen makes it easy to abandon a flight plan and fly to the closest airport in an emergency. A list of the airports closest to your current position is displayed, along with the magnetic bearing and distance to each. Scroll through the list using the Up and Down arrow buttons. The highlighted airport's coordinates are displayed at the bottom of the screen. Click the Enter button to enter the selected airport into the GPS as the next waypoint.
- **WARNING:** Once you click the Enter button, any waypoints from a loaded flight plan will be replaced with the Emergency waypoint you've selected! Click the Cancel button at any time before pressing Enter to revert to the waypoints that were loaded before you went to the Emergency screen.

The Menu Screen

- The Menu screen enables you to change what information is displayed on the Map screen, as well as the orientation of the map. Click the Up and Down arrow buttons to scroll through the list of display options, then click the Right and Left arrow buttons to toggle each item on or off. Orientation options include North Up (the map is positioned so that north is always at the top of the screen), Track Up (your aircraft is always pointed

APPENDIX C
Continued

toward the top of the screen and the map moves around the aircraft icon as you change heading), and Desired Up (the map is positioned so that the next waypoint is always at the top of the screen). Click the Enter button to input your changes and return to the Map screen, or the Cancel button to return to the Map screen without making any changes.

The Flight Computer

- The ASA E6-B Flight Computer has computer has two sides: the Wind face side and the Calculator side.
- The Calculator side consists of a rotating disk with numbers on the middle scale, which when set against similar numbers on the fixed portion (outer scale), allows you to solve problems of time, speed, and distance, calculate fuel consumption, and make conversions between measurements. The inner scale in graduated in hours.
- The Wind Face side has a ring with all 360 degrees of the compass around a transparent disk. Behind the disk is a grid card that can slide up and down behind the transparent disk.

- The ASA E6-B Flight Computer can do all kinds of calculations that you need for your flight. It can also help you to convert between values with simple settings. There are several important things you need to know before you start to use the flight computer:

  - The number 60 on the rotating disk is marked differently. The pyramid is the rate arrow. This arrow should be set with something per hour, either miles or gallons on the outer scale.
  - The "minutes" scale is on the middle scale, while the "hours" scale is on the inner scale.
  - Speed, distance, and fuel burned are always on the outer scales. The number 10 can be read as 0.1, 1, 10, 100, 1000, 10000, etc., depending on the context of the problem.

Airspeed

- The speed of the airplane determines how quickly it will reach the destination and this has everything to do with how much fuel will be needed for the flight. If an airplane flies against a strong headwind, it will take longer to reach the destination. This means more fuel will be required.
- The speed of an airplane is not a fixed value. There are several types of speed that pilots must become familiar with and use.

- The first airplane speed is called ***Indicated Airspeed*** **(IAS)** and is the easiest to obtain. Indicated Airspeed is simply whatever speed is indicated on the dial. Usually the knot of indicated airspeed can be obtained from the airspeed indicator. The Airspeed Indicator and the Pilot Tube arrangement have some built-in problems. When the air rushes into

APPENDIX C
Continued

the Pilot Tube, any change in the air's speed through the tube that is different from the actual airflow speed at the Pilot will cause the Airspeed Indicator to read in error. This is referred to as an *instillation error*. When a pilot takes the IAS and changes that number to allow for this instillation error, the speed number is then known as the ***Calibrated Airspeed*** (CAS). Knots of CAS is called KCAS.

- After Calibrated Airspeed has been determined, other factors must be considered. Pilots must calculate the True Airspeed (TAS). The TAS is the true speed in which the airplane is traveling through the air. To arrive at a number for TAS you must take account of two factors, temperature and pressure

- The factor that has the greatest effect on the airplane in flight is the wind. Wind affects both direction and speed. If the pilot does not compensate for wind direction he will eventually be off course, and the wind can either help or hinder the airplane's progress. ***Ground Speed (GS)*** is the sum of wind speed and TAS. It is the Ground Speed that determines how long the airplane will be in the air and ultimately how much fuel is needed to arrive safely. The GS can be read from the flight simulator - GPS.

Time, Speed, and Distance

- To determine the length of time to travel a known distance with a certain Ground Speed we use the Calculator side of the Flight Computer.
- ***Steps to calculate time:***
  1. Turns the wheel of the calculator side, so that the rate arrow points directly at the Ground Speed you get from the flight simulator.
  2. Look for the distance you have known on the outer scale
  3. Look directly opposite to the distance value on the inner or middle scale to find the time.
- ***Steps to calculate distance with know time and ground speed:***
  1. Set the rate arrow at the Ground Speed on the outer scale
  2. Find the time either in middle or inner scale
  3. Look directly opposite to the time on the outer scale to get the distance value

Sample Time/Speed Distance Problems

	Speed (kts)	*Distance (nm)*	*Time*
1.	95	30	________
2.	110	22	________
3.	________	12	9 minutes
4.	________	25	15 minutes
5.	82	___	30 minutes

APPENDIX C
Continued

Fuel Consumption

- Now the most important calculation: Fuel needed for the flight. The amount of fuel the airplane will burn on a flight depends on two factors:

- First, the time the airplane's engine is operating, which can be calculated as stated above. The only difference is the name for the time changes. Now, time is called fuel endurance time.

- Second, the speed in which the fuel is burned when the engine is operating. It is the fuel rate: ***Gallons Per Hour*** **(GPH),** the "fuel flow". The GPH rate depends on three factors: Pressure Altitude, Temperature, and the speed the pilot operates the engine: RPM. And GPH can be read directly from the flight simulator.

- ***Steps to calculate fuel consumption :*** Since we already know the time and GPH value, we can calculate the fuel consumption by using the flight computer. The steps are:

    1. Line up the rate arrow with the GPH value on the outer scale
    2. Fine the time on the inner or middle scale
    3. Read directly the fuel burned value (opposite to the time) on the outer scale

Sample Fuel Consumption Problems

	GPH	**Time**	**Fuel Burned (gal)**
1.	6.4	15 mins	________
2.	6.6	5 mins	________
3.	7.2	2 hrs 30 min	________
4.	8.5	3 hrs 10 min	________
5.	___	1 hr 15 min	9 gallons
6.	___	30 mins	9 gallons
7.	___	1 hr 30 mins	13 gallons
8.	___	10 mins	1.5 gallons

Example of Fuel Available for the Trip

24.5 Usable Fuel in the Airplane

Minus 0.8 Allowance for Start, Taxi, and Runup

Equals 23.7 Fuel Available at Takeoff

APPENDIX C
Continued

Example of Fuel Required for the Trip

0.8	Allowance for Start, Taxi, and Runup	
Plus	1.0	Climb Fuel
Plus	2.16	Enroute Fuel
Plus	1.8	Required Fuel Reserve (Day or Night)
Equal	5.76	Total required for the Flight

Adverse Weather Conditions
The VFR-into-IFR accident has always been the biggest safety problem for general aviation.

- Obtain a good preflight briefing, and stay informed during the flight. This means knowing thoroughly the current and forecast weather along your route, and checking in with flight watch (122.0 MHz) while en route.
- Turn back or land at the first sign of growing cells crossing your route of flight. If forecasts call for thunderstorms with the potential for covering more than 50 percent of the area along your route of flight, be spring-loaded for a 180-degree turn or a diversion to an alternate.
- **Fly attitude**. This is the prime directive. Do your best to keep the nose on the attitude indicator's artificial horizon and keep the wings level. This is the best way to keep both airspeed and G-forces to a minimum while in the storm.
- **Accept altitude excursions.** Don't chase the altimeter in an attempt to hold an assigned altitude. Instead, fly a level pitch attitude as mentioned above.
- **Do not extend the flaps.** An airplane's flap-extended flight envelope is relatively small. As a result, an airplane with flaps extended can more easily suffer G-force-related damage and structural failure in turbulence.
- Maintain your heading. Turning can induce huge G forces, and the quickest way out of a storm is often to just bear with it and forge ahead. A 180-degree turn could be disastrous, because of high, turbulence-induced G loads during the prolonged time required for a standard-rate-turn course reversal. If course corrections are needed, make heading changes slowly and with minimal bank angles.
- Keep your wits. Of course you're scared. But remember that others have made it through thunderstorms. By following the advice listed above, you're doing all that you can to avoid the worst outcome of a clash with a thunderstorm.
    - For the nose-low spiral attitude, reduce power, level the wings, raise the nose
    - If the airspeed is decreasing rapidly the altitude is increasing, use the attitude indicator to bring the nose back to the horizon, simultaneously level the wings and increase power to prevent a stall.

Allow students to practice flying in bad weather

APPENDIX C
Continued

Duties of Captain/Pilot and Navigator/Copilot

Captain/Pilot duties

- Fly the airplane – responsible for monitoring and maintaining altitude, attitudes, and airspeed
- Insuring safety of the mission
- Insuring completion of the mission
- Insuring the performance of the machine and crew

Navigator/Copilot duties

- Monitoring progress of route
- Communications from ATC
- Monitor weather along flight path and to destination
- Monitoring aircraft instruments and status
- Operate the landing gear

APPENDIX D: Chinese Personality Assessment Inventory

1. I always try hard to get along well with others. Y N
2. If someone offends me, I will try hard to forgive them. Y N
3. When I do something I am always very careful not to embarrass anyone. Y N
4. Usually when I talk with people I take great care not to offend them. Y N
5. I always maintain a peaceful frame of mind. Y N
6. When I accomplish something important, I try hard not to get too excited, because I know that success does not happen very often. Y N
7. I accept my position in the society, and I also think it is a fair reflection of my abilities and my disposition. Y N
8. Human beings will definitely be punished for destroying the law of nature. Y N
9. I strongly support the principle that if a family lives in harmony, all things will prosper. Y N
10. My mind is at peace, and I have few desires. Y N
11. I seldom argue with my family. Y N
12. The saying "Harmony is most valuable" is very true. Y N
13. It is a virtue to tolerate everything. Y N
14. I follow the saying that "Those who are contented are always happy" as a principle in life. Y N
15. I feel extremely uneasy in a situation where my friends are having an argument. Y NAs long as

people do what I instruct them to do, there will be a great chance of success. Y N

17. When in a group of people, I am good at coming up with new ideas. Y N
18. I always step forward to give my suggestions to others. Y N
19. In discussions, others often find it difficult to refute my opinion. Y N
20. When several people are working together on something and there is no one around to lead them, I will take over. Y N
21. I like to mediate in other people's conflicts. Y N
22. I have a natural ability to influence others. Y N
23. Many people seem drawn to me and want to ask my opinion before they make a decision. Y N
24. I am willing to be the initiator or leader when I am doing something. Y N
25. I am very active. Y N
26. I like challenges of any kind. Y N
27. I am scared of big changes. Y N
28. I like trying to resolve problems that others find difficult. Y N
29. Achieving success is an important goal that I strive for in life. Y N
30. I really hope I will become an important person. Y N

APPENDIX D
Continued

31. Sometimes I pretend I understand a lot, because I do not want others to look down on me. Y N
32. I always think about other people's opinion of me before I do something. Y N
33. I pay a lot of attention to how others see me. Y N
34. I usually care a lot about my appearance. Y N
35. Inviting someone out to dinner has to be done in style in order to keep up appearances. Y N
36. I am usually very particular about the way I dress because I do not want others to look down on me. Y N
37. I feel a loss of face when others turn down my favor. Y N
38. I would rather cut down on my regular expenses, but when it comes to inviting out or giving presents to someone, I feel obliged to be generous. Y N
39. Sometimes when I make a mistake I am not ready to admit it in public, even though I know I am wrong. Y N
40. I prefer not to discuss my weaknesses, even with my closest friends. Y N
41. Sometimes I will insist on giving a friend a decent gift even if it means borrowing money to buy it. Y N
42. I pay a lot of attention to what kind of attitude people have toward me. Y N
43. When I am eating out and others have already finished their meal, I will also stop eating and pretend I am full, even if I am not. Y N
44. Even if I were poor, I would still try to buy a presentable coat. Y N
45. I always worry I will not say the most appropriate thing when I am interacting with strangers. Y N
46. If one of my friends or relatives was taken to a hospital, I would definitely go visit him/her. Y N
47. It is best not to show off too much so as to avoid offending others. Y N
48. When dealing with institutions, things can work out more smoothly through the connections of friends working inside. Y N
49. A kind attitude of forgiveness, honesty, respect, magnanimity, etc is an important precondition for people to be successful in society. Y N
50. Though I may be perfectly aware of my friends' lack of ability, if they ask me to find them a good job I will do my best to help them Y N
51. During holidays, relatives and friends should visit one another and strengthen their relationships. Y N
52. I find it very hard to say "No" when others make requests or give me assignments. Y N
53. I would say it is natural for anyone in official positions to give preferential treatment to their friends and relatives. Y N
54. Returning money is easier than returning emotions, so the best thing to do is not to become indebted to people emotionally. Y N
55. When a friend borrows something from me and does not return it, I often feel uneasy about asking him/her to give it back. Y N

APPENDIX D

Continued

56. Blood is thicker than water, and no matter what, one's feelings for one's family are closer than for people outside the family. Y N
57. When people show me respect, I should show them more respect in return. Y N
58. The more people I know and the better my relations with them, the easier it will be for me to make it in society. Y N
59. Do not do unto others what you do not wish others to do to you. In society one should be considerate to others and avoid causing harm to others. Y N
60. When I am doing something urgent and a friend or a relative comes to see me, I will put my work aside and entertain them without making them wait. Y NCompared
to others, our family is lacking in intimacy and compassion. Y N
62. Some of my family members' habits irritate me. Y N
63. Sometimes I hate my family members. Y N
64. I get angry when my family tells me how I should live my life. Y N
65. I often have serious clashes of opinion with my family. Y N
66. I do not see my relatives often these days. Y N
67. I am willing to sacrifice everything for the sake of my family. Y N
68. If I have something to do and expect to be late at home, I will usually let my family know in advance. Y N
69. Sometimes my family members tell me trivial matters; that annoys me very much. Y N
70. There are many things I do not feel easy about telling my family. Y N
71. During holidays and vacations, I often engage in recreational activities with my family. Y N
72. There are many family photos in my home. Y N
73. My parents are good to me. Y N
74. My family would not be peaceful if I were not so tolerant. Y N
75. Usually I prefer to be with my intimate friends rather than my family. Y N
76. Generally speaking, there can only be one correct solution. Y N
77. I get irritated when unpredictable events disrupt my daily routine. Y N
78. I hate things that are uncertain or unpredicted. Y N
79. Once I have made a decision I will seldom change it. Y N
80. I believe I have a much stricter sense of right and wrong than most people. Y N
81. I advocate the idea that all laws must be strictly enforced, regardless of the consequences. Y N
82. I always insist on making detailed plans and schedules of my works. Y N
83. I cannot stand people who can never make up their mind. Y N
84. All things can be divided into right and wrong. Y N
85. I often wish everyone would talk with me in a straightforward and unambiguous way. Y N

APPENDIX D
Continued

86. Once I have made my plans I seldom change them. Y N
87. I feel annoyed if my everyday life or work is disrupted by something unexpected. Y N
88. I am very demanding on myself; it would be great if everyone else was like that. Y N
89. Whenever I start some kind of work, I always make a schedule and plan all the details. Y N
90. It would be great if everyone had a similar way of thinking or a similar system of values. Y N
91. Ancestral sacrifices, weddings, funerals, etc. should be conducted in keeping with their traditional forms and etiquette, i.e. without any arbitrary changes. Y N
92. To avoid mistakes in life, the best thing to do is to listen to what the elders say. Y N
93. Kids that deserve the most praise are those who obey the rules just as adults do. Y N
94. If teachers or superiors are mistaken, it is acceptable for students or inferiors to contradict them. Y N
95. Parents should not interfere with their children's freedom to choose a profession. Y N
96. If a dispute cannot be resolved, a family elder should be invited to act as an arbiter to uphold justice. Y N
97. Students need to be completely devoted to learning, and should not get distracted by what is happening in the society. Y N
98. There is no stigma about marrying a divorced person. Y N
99. Children do not have to follow their parents' wishes when choosing a partner for marriage. Y N
100. A woman's chastity is more important than her life. Y N
101. The belief that "you can count on your children to be a safety net for your old age" is outdated. Y N
102. Education is a sacred profession, and therefore teachers should not mind too much about their pay. Y N
103. Eccentric clothes and hairstyles should be strictly banned so as to preserve traditional simplicity. Y N
104. It is impossible even for the most decent people to be entirely without evil thoughts. Y N
105. If the content of some TV programs or movies does not conform to our culture, they should be eliminated with no exceptions. Y NI like doing things that are very risky. Y N
107. I often fear that in the future I may experience a sense of hopelessness. Y N
108. I do not like to take part in activities where I have to compete in public. Y N

APPENDIX D

Continued

109. I am prepared to take the lead in doing many things. Y N
110. I always manage to keep calm when I am faced with danger. Y N
111. I am prepared to try almost anything. Y N
112. I would prefer to pursue a career that is relatively stable even though the salary is lower. Y N
113. I am willing to take up a job only when there is a great chance of success. Y N
114. I used to wish I had the chance to take part in an expedition. Y N
115. I have noticed that I always fall to the back of the group when crossing a busy road. Y N
116. I will not take part in contests where there are crowds of smart people. Y N
117. Unless I feel completely certain about something, I will not undertake to do it. Y N
118. I often feel a sense of uncertainty when I am working. Y N
119. I feel extremely restless when making important decisions. Y N
120. I often worry that things I do will go wrong. Y NIn the long run, I will achieve the success I deserve. Y N
122. An individual is unlikely to become a successful leader without being given the right opportunity. Y N
123. I do not believe too much in luck but rely instead on my persistent hard work. Y N
124. Only lucky people can find a good job. Y N
125. It is never wise to make long-term plans, because everything in this world keeps changing and is unpredictable Y N
126. Whether someone can be a success depends on his/ her talent and hard work rather than on luck and opportunity. Y N
127. Often I feel I have no control over what is happening to me. Y N
128. I think there is no way for me to be certain about the future. Y N
129. Often it is best for us to make a decision by drawing lots. Y N
130. Who will become the leader often depends on luck. Y N
131. I believe in the saying that "If two people are destined to meet, no distance can keep them apart, but if they are not so destined, they won't meet even if they are at the same place." Y N
132. I think that the saying "People propose, God disposes" is very true. Y N
133. I believe that as long as I am prepared to work hard, I can create a good future for myself. Y N
134. I believe that all things are predestined in destiny. Y N
135. When I do things I always keep in mind that "human beings will always overcome nature." Y N

APPENDIX E: ***Flight Management Attitudes Questionnaire2.0 (International) XX Pilots***

The success of the survey depends on your contribution, so it is important that you answer questions as honestly as you can. There are no right or wrong answers, and often the first answer that comes to mind is best. **Individual responses are absolutely confidential.**

Part I - Flight Management Attitudes.
Please answer the following items by writing your response beside each item using the following scale

A	B	C	D	E
Disagree Strongly	Disagree Slightly	Neutral	Agree Slightly	Agree Strongly

1. ____The captain should take physical control and fly the aircraft in emergency and non-standard situations.
2. ____Captains should encourage crewmember questions during normal flight operations and in emergencies.
3. ____Even when fatigued, I perform effectively during critical times in a flight.
4. ____The airline's rules should not be broken - even when the employee thinks it is in the airline's best interests.
5. ____I expect to be consulted on matters that affect the performance of my duties.
6. ____Senior staff deserve extra benefits and privileges.
7. ____I let other crewmembers know when my workload is becoming (or about to become) excessive.
8. ____Captains who encourage suggestions from crewmembers are weak leaders.
9. ____My decision-making ability is as good in emergencies as in routine flying conditions.
10. ____Junior crewmembers should not question the captain's or senior crewmembers' decisions.
11. ____It is better to agree with other crewmembers than to voice a different opinion.
12. ____The captain's responsibilities include coordination between the cockpit and cabin crew.
13. ____I am more likely to make judgment errors in an emergency.
14. ____Successful flight deck management is primarily a function of the captain's flying proficiency.
15. ____If I perceive a problem with the flight, I will speak up, regardless of who might be affected.
16. ____I am ashamed when I make a mistake in front of my other crewmembers.
17. ____In abnormal situations, I rely on my superiors to tell me what to do.
18. ____Crewmembers should not question actions of the captain except when they threaten the safety of the flight.
19. ____I am less effective when stressed or fatigued.
20. ____My performance is not adversely affected by working with an inexperienced or less capable crewmember.

APPENDIX E
Continued

21. ____To resolve conflicts, crewmembers should openly discuss their differences with each other.
22. ____Crewmembers should monitor each other for signs of stress or fatigue.
23. ____Personal problems can adversely affect my performance.
24. ____A truly professional crewmember can leave personal problems behind when flying.

25. ____Except for total incapacitation of the captain, the first officer should never assume command of the aircraft.
26. ____Written procedures are necessary for all in-flight situations.
27. ____Crewmembers should mention their stress or physical problems to other crew before or during a flight.
28. ____Good communication and crew coordination are as important as technical proficiency for flight safety.
29. ____ Effective crew coordination requires crewmembers to consider the personal work styles of other crewmembers.
30. ____During periods of low work activity, I would rather relax than keep busy with small tasks.
31. ____A true professional does not make mistakes.
32. ____An essential captain duty is training first officers.
33. ____ How frequently, in your work environment, are subordinates afraid to express disagreement with their superiors?
    A. Very frequently B. Frequently C. Sometimes D. Seldom E. Very seldom
34. ____ How often do you feel nervous or tense at work?
    A. Always B. Usually C. Sometimes D. Seldom E. Never

Part II. Leadership Styles
Please read the following descriptions of four different leadership styles, and answer the questions that follow.
Style A Leader usually makes decisions promptly and communicates them to subordinates clearly and firmly. Expects them to carry out the decisions loyally and without raising difficulties.
Style B Leader usually makes decisions promptly, but, before going ahead, tries to explain them fully to subordinates. Gives them the reasons for the decisions and answers whatever questions they may have.
Style C Leader usually consults with subordinates before reaching decisions. Listens to their advice, considers it, and then announces decision. Expects all to work loyally to implement it whether or not it is in accordance with the advice they gave.
Style D Leader usually calls a meeting of subordinates when there is an important decision to be made. Puts the problem before the group and invites discussion. Accepts the majority viewpoint as the decision.

APPENDIX E
Continued

First and Second officers, please think of Captains when answering the next two questions; Captains, please think of Flight Ops. Management.

___ 1. Which one of the above styles of leadership would you *most prefer* to work under?
___2. In your organization, which style do you find yourself most often working under?

Part III - Work values and goals

Please answer the items below by writing beside each item a letter from the scale below.

A	B	C	D	E
Of very little or no importance	Of little importance	Of moderate importance	Very Important	Of Utmost Importance

Please think of your *ideal* job - disregarding your present job. In choosing an *ideal* job, how important would it be to you to:

1. ____Maintain good interpersonal relationships with fellow workers or crewmembers?
2. ____Have an opportunity for advancement to higher level jobs?
3. ____Have security of employment?
4. ____Live in an area desirable to you and your family?
5. ____Have a changing work routine with new, unfamiliar tasks?
6. ____Have a warm relationship with your direct superior?
7. ____Have an opportunity for high earnings?
8. ____Have challenging tasks to do, from which you get a personal sense of accomplishment?
9. ____Know everything about the job, to have no surprises?
10. ____Have sufficient time left for your personal or family life?
11. ____Work with people who cooperate well with one another?
12. ____Find the truth, the correct answer, the one solution?
13. ____Observe strict time limits for work projects?

Part IV Cockpit Automation

The following items deal with attitudes regarding flightdeck automation. For purposes of this survey, automated aircraft are defined as those with a programmable Flight Management Computer (FMC). If you are currently flying an automated aircraft, base you responses on experience in this airplane. *If you have not flown such an airplane, base your answers on your expectations regarding such aircraft*. Please answer by writing beside each item a letter from the scale below.

A	B	C	D	E
Disagree Strongly	Disagree Slightly	Neutral	Agree Slightly	Agree Strongly

1. ____I prefer flying automated aircraft.
2. ____Under abnormal conditions, I can rapidly access the information I need in the FMC.
3. ____The effective crewmember always uses the automation tools provided.
4. ____I am concerned that the use of automation will cause me to lose flying skills.

APPENDIX E
Continued

5. ____It's easy to forget how to do FMC operations that are not performed often.
6. ____I look forward to more automation - the more the better.
7. ____Pilots should avoid disengaging automated systems.
8. ____There are modes and features of the FMC that I do not fully understand.
9. ____Automated cockpits require more verbal communication between crewmembers.
10. ____I regularly maintain flying proficiency by disengaging automation.
11. ____Automated cockpits require more cross-checking of crewmember actions.
12. ____My company expects me to always use automation.
13. ____I feel free to select the level of automation at any given time.
14. ____Automated systems should be used at the crews' discretion.
15. ____Flying highly automated aircraft alters the way crewmembers transfer information.
16. ____I try to use automation as much as possible during flight operations.
17. ____It is difficult to know what FMC operations the other crewmember is performing.

Thank you for taking the time to complete the questionnaire. Your participation is appreciated.

APPENDIX F: Individualism/Collectivism Scale

These questions are statements with which you might strongly agree, agree, cannot decide on, or strongly disagree. You are asked to state your position. This is a measure of personal belief. There are no right or wrong answers. In short, use the key:

1	2	3	4	5
Strongly Disagree				Strongly Agree

1. The well-being of my co-workers is important to me.	
2. Even it would be inconvenient, I will offer help to a colleague who is in difficulty.	
3. I usually sacrifice my self-interest for the benefit of my group.	
4. It is important to me that I respect decisions made by my groups even when I personally disagree.	
5. I respect the majority's wishes in groups of which I am a member.	
6. A collective's interest will eventually lead to the interest of individuals. Without protecting the interest of the collective, the interest of an individual won't last long.	
7. For the benefit of a collective, I am willing to sacrifice myself a little bit, even if doing so will not gain any attention from the superiors.	

APPENDIX G: Power Distance Scale

These questions are statements with which you might strongly agree, agree, cannot decide on, or strongly disagree. You are asked to state your position. This is a measure of personal belief. There are no right or wrong answers. In short, use the key:

1	2	3	4	5
Strongly Disagree				Strongly Agree

1. In most situations managers should make decisions without consulting their subordinates.	
2. In work-related situations managers have a right to expect obedience from their subordinates.	
3. Employees who often question authority sometimes keep their managers from being effective.	
4. Once a top-level executive makes a decision, people working for the company should not question it.	
5. Employees should not express disagreements with their managers in public.	
6. Good managers should be able to make the right decisions without consulting others.	
7. Managers who let their employees participate in decisions too often will lose power and authority.	
8. A company's rules should not be broken, not even when the employee thinks it is in the company's best interest.	
9. It's all natural for company's top managers to enjoy some privileges.	
10.Subordinates should always address the official title or a title with respect to their superiors.	

APPENDIX H: *Schwartz Cultural Values Survey*

In this questionnaire you are to ask yourself: "What values are important to ME as guiding principles in MY life, and what values are less important to me?" There are two lists of values on the following pages. These values come from different cultures. In the parentheses following each value is an explanation that may help you to understand its meaning.

Your task is to rate how important each value is for you as a guiding principle in your life. Use the rating scale below:

0--means the value is not at all important, it is not relevant as a guiding principle for you.
3--means the value is important.
6--means the value is very important.

The higher the number (0, 1, 2, 3, 4, 5, 6), the more important the value is as a guiding principle in YOUR life.

-1 is for rating any values opposed to the principles that guide you.
7 is for rating a value of supreme importance as a guiding principle in your life;
ordinarily there are no more than two such values.

In the space before each value, write the number (-1,0,1,2,3,4,5,6,7) that indicates the importance of that value for you, personally. Try to distinguish as much as possible between the values by using all the numbers. You will, of course, need to use numbers more than once.

AS A GUIDING PRINCIPLE IN MY LIFE, this value is:

opposed to my values	not important			important			very important	of supreme importance
-1	0	1	2	3	4	5	6	7

Before you begin, read the values in List I, choose the one that is most important to you and rate its importance. Next, choose the value that is most opposed to your values and rate it -1. If there is no such value, choose the value least important to you and rate it 0 or 1, according to its importance. Then rate the rest of the values in List I.

VALUES LIST I

1 ____EQUALITY (equal opportunity for all)

2 ____INNER HARMONY (at peace with myself)

3 ____SOCIAL POWER (control over others, dominance)

4 ____PLEASURE (gratification of desires)

5 ____FREEDOM (freedom of action and thought)

6 ____A SPIRITUAL LIFE (emphasis on spiritual not material matters)

7 ____SENSE OF BELONGING (feeling that others care about me)

APPENDIX H
Continued

AS A GUIDING PRINCIPLE IN MY LIFE, this value is:

opposed to my values	not important			important			very important	of supreme importance
-1	0	1	2	3	4	5	6	7

8 ____SOCIAL ORDER (stability of society)

9 ____AN EXCITING LIFE (stimulating experiences)

10___MEANING IN LIFE (a purpose in life)

11____POLITENESS (courtesy, good manners)

12____WEALTH (material possessions, money)

13____ NATIONAL SECURITY (protection of my nation from enemies)

14____ SELF RESPECT (belief in one's own worth)

15____RECIPROCATION OF FAVORS (avoidance of indebtedness)

16____CREATIVITY (uniqueness, imagination)

17____A WORLD AT PEACE (free of war and conflict)

18____RESPECT FOR TRADITION (preservation of time-honored customs)

19____MATURE LOVE (deep emotional & spiritual intimacy)

20____SELF-DISCIPLINE (self-restraint, resistance to temptation)

21____PRIVACY (the right to have a private sphere)

22____FAMILY SECURITY (safety for loved ones)

23____SOCIAL RECOGNITION (respect, approval by others)

24____UNITY WITH NATURE (fitting into nature)

25____A VARIED LIFE (filled with challenge, novelty and change)

26____WISDOM (a mature understanding of life)

27____AUTHORITY (the right to lead or command)

28____TRUE FRIENDSHIP (close, supportive friends)

29____A WORLD OF BEAUTY (beauty of nature and the arts)

30____SOCIAL JUSTICE (correcting injustice, care for the weak)

APPENDIX H
Continued

VALUES LIST II

Now rate how important each of the following values is for you as a guiding principle in YOUR life. These values are phrased as ways of acting that may be more or less important for you. Once again, try to distinguish as much as possible between the values by using all the numbers.

Before you begin, read the values in List II, choose the one that is most important to you and rate its importance. Next, choose the value that is most opposed to your values, or--if there is no such value--choose the value least important to you, and rate it -1, 0, or 1, according to its importance. Then rate the rest of the values.

AS A GUIDING PRINCIPLE IN MY LIFE, this value is:

opposed to my values	not important			important			very important	of supreme importance
-1	0	1	2	3	4	5	6	7

31____ INDEPENDENT (self-reliant, self-sufficient)

32____ MODERATE (avoiding extremes of feeling & action)

33____LOYAL (faithful to my friends, group)

34____AMBITIOUS (hard-working, aspiring)

35____BROADMINDED (tolerant of different ideas and beliefs)

36____HUMBLE (modest, self-effacing)

37____DARING (seeking adventure, risk)

38____PROTECTING THE ENVIRONMENT (preserving nature)

39____INFLUENTIAL (having an impact on people and events)

40____HONORING OF PARENTS AND ELDERS (showing respect)

41____CHOOSING OWN GOALS (selecting own purposes)

42____HEALTHY (not being sick physically or mentally)

43____CAPABLE (competent, effective, efficient)

44____ACCEPTING MY PORTION IN LIFE (submitting to life's circumstances)

45____HONEST (genuine, sincere)

46____PRESERVING MY PUBLIC IMAGE (protecting my "face")

APPENDIX H
Continued

47____OBEDIENT (dutiful, meeting obligations)

48____INTELLIGENT (logical, thinking)

49____HELPFUL (working for the welfare of others)

50____ENJOYING LIFE (enjoying food, sex, leisure, etc.)

51____DEVOUT (holding to religious faith & belief)

52____RESPONSIBLE (dependable, reliable)

53____CURIOUS (interested in everything, exploring)

54____FORGIVING (willing to pardon others)

55____SUCCESSFUL (achieving goals)

56____CLEAN (neat, tidy)

57____SELF-INDULGENT (doing pleasant things)

APPENDIX I: *Task Shared Mental Model Questionnaire (SMM)*

Below are several descriptions of the technical aspects of flying the simulator. Please rate how related each aspect is to all of the others to complete the flight. Use the following response scale and circle your answer to each question.

4 -3 -2 -1 0 +1 +2 +3 +4

Negatively Related	**Totally Unrelated**	**Positively Related**
A high degree of one requires a low degree of the other.		A high degree of one requires a high degree of the other.

1. How related are altimeter and banking?
   4 -3 -2 -1 0 +1 +2 +3 +4

2. How related are altimeter and airspeed?
   4 -3 -2 -1 0 +1 +2 +3 +4

3. How related are altimeter and pitch?
   4 -3 -2 -1 0 +1 +2 +3 +4

4. How related are altimeter and stalls?
   4 -3 -2 -1 0 +1 +2 +3 +4

5. How related are altimeter and climbing?
   4 -3 -2 -1 0 +1 +2 +3 +4

6. How related are altimeter and landing?
   4 -3 -2 -1 0 +1 +2 +3 +4

7. How related are altimeter and flaring?
   4 -3 -2 -1 0 +1 +2 +3 +4

8. How related are altimeter and power?
   4 -3 -2 -1 0 +1 +2 +3 +4

9. How related are altimeter and straight and level flight?
   4 -3 -2 -1 0 +1 +2 +3 +4

10. How related are banking and airspeed?
    4 -3 -2 -1 0 +1 +2 +3 +4

11. How related are banking and pitch?
    4 -3 -2 -1 0 +1 +2 +3 +4

APPENDIX I

Continued

12. How related are banking and stalls?
    4 -3 -2 -1 0 +1 +2 +3 +4

13. How related are banking and climbing?
    4 -3 -2 -1 0 +1 +2 +3 +4

14. How related are banking and landing?
    4 -3 -2 -1 0 +1 +2 +3 +4

15. How related are banking and flaring?
    4 -3 -2 -1 0 +1 +2 +3 +4

16. How related are banking and power?
    4 -3 -2 -1 0 +1 +2 +3 +4

17. How related are banking and straight and level flight?
    4 -3 -2 -1 0 +1 +2 +3 +4

18. How related are airspeed and pitch?
    4 -3 -2 -1 0 +1 +2 +3 +4

19. How related are airspeed and stalls?
    4 -3 -2 -1 0 +1 +2 +3 +4

20. How related are airspeed and climbing?
    4 -3 -2 -1 0 +1 +2 +3 +4

21. How related are airspeed and landing?
    4 -3 -2 -1 0 +1 +2 +3 +4

22. How related are airspeed and flaring?
    4 -3 -2 -1 0 +1 +2 +3 +4

23. How related are airspeed and power?
    4 -3 -2 -1 0 +1 +2 +3 +4

24. How related are airspeed and straight and level flight?
    4 -3 -2 -1 0 +1 +2 +3 +4

25. How related are pitch and stalls?
    4 -3 -2 -1 0 +1 +2 +3 +4

APPENDIX I
Continued

26. How related are pitch and climbing?
    4 -3 -2 -1 0 +1 +2 +3 +4

27. How related are pitch and landing?
    4 -3 -2 -1 0 +1 +2 +3 +4

28. How related are pitch and flaring?
    4 -3 -2 -1 0 +1 +2 +3 +4

29. How related are pitch and power?
    4 -3 -2 -1 0 +1 +2 +3 +4

30. How related are pitch and straight and level flight?
    4 -3 -2 -1 0 +1 +2 +3 +4

31. How related are stalls and climbing?
    4 -3 -2 -1 0 +1 +2 +3 +4

32. How related are stalls and landing?
    4 -3 -2 -1 0 +1 +2 +3 +4

33. How related are stalls and flaring?
    4 -3 -2 -1 0 +1 +2 +3 +4

34. How related are stalls and power?
    4 -3 -2 -1 0 +1 +2 +3 +4

35. How related are stalls and straight and level flight?
    4 -3 -2 -1 0 +1 +2 +3 +4

36. How related are climbing and landing?
    4 -3 -2 -1 0 +1 +2 +3 +4

37. How related are climbing and flaring?
    4 -3 -2 -1 0 +1 +2 +3 +4

38. How related are climbing and power?
    4 -3 -2 -1 0 +1 +2 +3 +4

39. How related are climbing and straight and level flight?
    4 -3 -2 -1 0 +1 +2 +3 +4

APPENDIX I
Continued

40. How related are landing and flaring?
4 -3 -2 -1 0 +1 +2 +3 +4

41. How related are landing and power?
4 -3 -2 -1 0 +1 +2 +3 +4

42. How related are landing and straight and level flight?
4 -3 -2 -1 0 +1 +2 +3 +4

43. How related are flaring and power?
4 -3 -2 -1 0 +1 +2 +3 +4

44. How related are flaring and straight and level flight?
4 -3 -2 -1 0 +1 +2 +3 +4

45. How related are power and straight and level flight?
4 -3 -2 -1 0 +1 +2 +3 +4

APPENDIX J: ***NASA-TLX Workload Measure***

Subject Number: ____________ Date: ______________

Title **Descriptions**	
MENTAL DEMAND : How much mental and perceptual activity was required (e.g., thinking, deciding, calculating, remembering, looking, searching, etc.)? Was the task easy or demanding, simple or complex, exacting or forgiving?	MENTAL DEMAND Low High
PHYSICAL DEMAND: How much physical activity was required (e.g., pushing, pulling, turning, controlling, activating, etc.)? Was the task easy or demanding, slow or brisk, slack or strenuous, restful or laborious?	PHYSICAL DEMAND Low High
TEMPORAL DEMAND: How much time pressure did you feel due to the rate or pace at which the task or tasks elements occurred? Was the pace slow and leisurely or rapid and frantic?	TEMPORAL DEMAND Low High
PERFORMANCE: How successful do you think you were in accomplishing the goals of the task set by the experimenter (or yourself)? How satisfied were you with your performance in accomplishing these goals?	PERFORMANCE Low High

APPENDIX J
Continued

EFFORT: How hard did you have to work (mentally and physically) to accomplish your level of performance?

EFFORT

Low High

FRUSTRATION LEVEL: How insecure, discouraged, irritated stressed and annoyed versus secure, gratified, content, relaxed and complacent did you feel during the task?

FRUSTRATION LEVEL

Low High

APPENDIX K: *Pre-training Flight Knowledge Test*

Items

1. At what airspeed should you begin takeoff?
a. 50 knots
b. 60 knots
c. 70 knots
d. 80 knots

2. What is the desirable airspeed for climbing?
a. 55-65 knots
b. 70-80 knots
c. 85-90 knots
d. 100-110 knots

3. What is cruising altitude for the Cessna 182-S?
a. 4500 feet
b. 5500 feet
c. 6500 feet
d. 7500 feet

4. Which of the following statements DOES NOT apply to straight and level flying?
a. Throttle should remain at its full position
b. Yoke should remain in its center position as long as the plane is tracking GPS and VOR

c. Keep the airplane on the attitude indicator level with the horizon

d. Make small smooth corrections to the pitch attitude and adjust the trim if the airplane starts to lost or gain altitude

5. Which instrument shows the degree of bank while in a turn?
a. Altitude Indicator (Altimeter)
b. Attitude Indicator
c. Heading Indicator
d. Vertical Speed Indicator

APPENDIX K
Continued

6. Which of the following functions should be performed while making a turn?
a. Reduce speed to 60 knots.

b. Pull back on the yoke slightly to maintain altitude

c. Push in on the yoke slightly to maintain altitude
d. Increase airspeed to 120-130 knots

7. What should you do if the plane stalls?

a. Lower the nose by pushing in on the yoke and increase power
b. Pull back on the yoke and increase power

c. Lower the nose by pushing in on the yoke and decrease power
d. Apply 13 degree pitch and full flaps

8. What is the recommended rate of descent for the Cessna 182-S?
a. 300-400 ft/min
b. 500-600 ft/min
c. 700-800 ft/min
d. 900-1000 ft/min

9. Which of the following DOES NOT apply to descents?
a. Reduce throttle slowly
b. Make corrections to trim as needed

c. Push forward on the yoke to point the airplane's nose down.

d. The manifold pressure gauge should show high pressure

10. What is the recommended airspeed for the final approach?
a. 55 knots
b. 65 knots
c. 75 knots
d. 85 knots

APPENDIX K
Continued

11. Which of the following statements best represents the correct sequence of functions to be performed for landing?

a. Reduce throttle to one-half, apply full flaps, push yoke forward to point airplane's nose down, then land on the first one-third of the runway

b. Apply forward pressure on yoke, apply 10 degree flaps, adjust pitch, then land on the first one-third of the runway

c. Apply forward pressure on yoke, apply 10 degree flaps, reduce speed to 65 knots, apply 20 degree flaps, reduce speed to 60 knots, apply full flaps, then land on the first one-third of the runway

d. Reduce the throttle to one-half, apply 10 degree flaps, adjust pitch as necessary, apply 20 degree flaps, reduce throttle to idle, apply full flaps, then land on the first one-third of the runway

12. Which of the following best represents the correct attitude for climbing after takeoff?
a. Between 1/4 and 1/2 attitude
b. Between 1/2 and 3/4 attitude
c. Between zero and 1/4 attitude
d. None of the above

13. Which of the following statements DOES NOT apply to GPS?
a. It is a space-based radio navigation system that provides users with information about their three dimensional position and velocity.

b. The bearing number represents the location of the plane's programmed destination while the tracking number represents the plane's location

c. The bearing and tracking numbers should be equal to each other

d. The bearing and tracking numbers should add up to 360 degrees if the VOR is simultaneously in use

APPENDIX L: *Post Flight Training Knowledge Test*

Items

1. Which instrument measures the aircraft's altitude?
a. Attitude Indicator
b. Heading Indicator
c. Manifold Pressure Gauge
d. Altimeter

2. What is the force that makes an airplane fly?
a. Thrust
b. Weight
c. Lift
d. Drag

3. What does the "2MIN" reading on the turn coordinator mean?
a. It will take the plane 2 minutes to make a 360-degree turn
b. It will take the plane 2 minutes to climb to cruising altitude
c. It will take the plane 2 minutes to land
d. It will take the plane 2 minutes to crash

4. What is the recommended airspeed for a steady climb following takeoff?
a. 55 knots
b. 65 knots
c. 75 knots
d. 85 knots

5. Which of the following should you NOT do if the plane stalls?
a. Push in on the yoke
b. Pull back on the yoke
c. Increase throttle pressure
d. Decrease angle of climb

6. Which of the following should be performed after reaching cruising altitude?
a. Reduce throttle to 1/2
b. Apply 10-degrees of flaps
c. Apply brakes
d. Pitch up

APPENDIX L
Continued

7. Which of the following instruments allows you to make minor corrections in straight and level flying after letting go of the yoke?
a. Flaps
b. Throttle
c. Trim wheel
d. None of the above

8. If you must climb while making a turn, which of the following represents the correct attitude at which to maintain the climb?
a. Between 1/2 and 3/4 attitude
c. Between zero and 1/4 attitude
c. Above 3/4 attitude
d. Between 1/4 and 1/2 attitude

9. The downwind leg refers to what?
a. Take-off
b. The 90-degree turn following take-off
c. The part of the flight pattern where you are parallel with the runway
d. The part of the flight pattern where you are lined up with the runway

10. The bearing and tracking numbers on the GPS refer to what?

a. The positions of the airport and plane, respectively

b. The positions of the runway and the plane, respectively

c. The airspeed of the plane and the ground position of the airport, respectively

d. The altitude and airspeed of the plane, respectively

11. At what airspeed should you begin to pull back on the throttle for take-off?
a. 40 knots
b. 50 knots
c. 60 knots
d. 70 knots

APPENDIX L
Continued

12. Which display allows you to abandon a planned flight and to fly to the nearest airport during a crisis?
a. Emergency Screen
b. Direct To Screen
c. Route Information Screen
d. Waypoint Information Screen

13. After full flaps are applied, which of the following functions should NOT be performed in order to complete the landing?
a. Correct for pitch up
b. Reduce the throttle to idle

c. Align the plane so that the nose gear touches the runway first

d. Pull back on yoke slightly to avoid slamming the plane into the ground

APPENDIX M: Team Behavior and Error Checklist

Directions:
1. Code frequencies for everything.
2. Code every behavior.
3. Code pilot and copilot scores. You do not need to compute a total score.
4. Leave blank any unobserved behaviors.

Assertiveness: Refers to the ability to initiate action

Pilot		Copilot
	Maintains one's position until convinced other wise by facts	
	Confronts ambiguities	
	Confronts conflicts	
	Asks questions when uncertain	
	States opinion on decisions	
	States opinion on procedures	

Decision-making: Refers to the ability to make logical and sound judgments based on available information

	Identifies possible solutions to problems (including alternatives and contingencies) and/or evaluates consequences of each alternative	
	Gathers information needed before making a decision, including evaluating information and resources	
	Identifies potential impact of unplanned events on mission	

Situational Awareness: Refers to the ability to maintain an accurate perception of the internal and external environment

	Identifies source and nature of problems or potential problems	
	Maintains an accurate perception of the aircraft's location relative to the external environment	
	Attempts to determine the cause of discrepant information before proceeding	
	Demonstrates ongoing awareness of mission status	

APPENDIX M
Continued

Team Leadership: Involves providing directions, structure, and support for other team members. Team leadership can be shown by both pilot and copilot.

	Ensure that other team member is working up to capacity to meet definite performance standards	
	Ask team member to follow definite performance standards	
	Are willing to listen to the problems/concerns of team member	
	Encourages team member	
	Gives direction to team member	
	Define and structure tasks	

Communication: Involves the exchange of information. Often the purpose of communication is to clarify or acknowledge the receipt of information.

	Communicate information related to the task	
	Clarify intentions to team member	
	Clarify procedures and performance status	
	Acknowledge and repeat messages to ensure understanding	
	Explain terminology to team member who does not understand its meaning	

Monitoring: Refers to observing the activities and performance of other team members.

	Observes performance of team member	
	Recognize when team member makes a mistake	
	Recognize when team member performs correctly (Task oriented)	
	Asks about performance of team member	

APPENDIX M
Continued

Feedback: Involves the giving, seeking, and receiving of information between team members. Giving feedback refers to providing information regarding other members' performance. Seeking feedback refers to requesting input or guidance regarding performance. Receiving feedback refers to accepting positive and negative information regarding performance.

	Respond to team member's requests for performance information	
	Seeks performance information from team member	
	Provide suggestions to team member to correct performance	

Backup Behavior: Involves assisting the performance of other team members.

	Takes control of team member's responsibilities	
	Helps team member correct mistakes	
	Solves a problem posed by another team member	
	Asks for help when needed	
	Maintains his own duties in the process of helping others	

Coordination: Refers to team members executing their activities in a timely and integrated manner. This may involve an exchange of information that subsequently influences another members' performance.

	Integrates efforts with others	
	Creates distractions during critical assignments **(NOTE: Subtract from total)**	
	Distributes tasks	

APPENDIX M
Continued

Noncompliance Errors: Violations of standard operating procedures

	Intentional failure to complete kneeboard **prior to takeoff**	
	Intentional failure to complete kneeboard **during takeoff**	
	Intentional failure to complete kneeboard **during climbing**	
	Intentional failure to complete kneeboard **during cruising**	
	Intentional failure to complete kneeboard **during descent**	
	Intentional failure to complete kneeboard **during landing**	
	Intentional failure to complete kneeboard **following landing**	
	Intentional failure to complete weather tracking log during 10 minute intervals	
	Unable to complete kneeboard **prior to takeoff** due to:	
	1. overload	
	2. distraction	
	3. unknown reasons	
	Unable to complete kneeboard **during takeoff** due to:	
	1. overload	
	2. distraction	
	3. unknown reasons	
	Unable to complete kneeboard **during climbing** due to:	
	1. overload	
	2. distraction	
	3. unknown reasons	
	Unable to complete kneeboard **during cruising** flight due to:	
	1. overload	
	2. distraction	
	3. unknown reasons	
	Unable to complete kneeboard **during descent** due to:	
	1. overload	
	2. distraction	
	3. unknown reasons	
	Unable to complete kneeboard **during landing** due to:	
	1. overload	
	2. distraction	
	3. unknown reasons	
	Unable to complete kneeboard **after landing** due to:	
	1. overload	
	2. distraction	
	3. unknown reasons	
	Unable to complete weather tracking log during 10 minute intervals due to:	
	1. overload	
	2. distraction	
	3. unknown reasons	

APPENDIX M
Continued

Communication Errors: Information that is incorrectly transmitted or interpreted within the cockpit crew or between the cockpit crew and external sources.

	Made no response to communication	
	Did not give information regarding current status	
	Failed to ask questions when uncertain or no request for clarification/verification	
	Incorrect interpretation among crewmembers	
	Incorrect interpretation between crewmembers and ATC	

Proficiency Errors: Indicates a lack of knowledge or a lack of stick and rudder skill.

	Lack of knowledge about GPS	
	Lack of knowledge about flight computer	
	Lack of knowledge about applying flaps in bad weather (should not apply flaps in bad weather)	
	Lack of stick and rudder skills during takeoff and/or climbing:	
	1. Incorrect throttle setting	
	2. Stalls plane	
	Lack of stick and rudder skills during cruising flight:	
	1. Incorrect throttle setting	
	2. Inability to maintain altitude	
	2. Heading error	
	Lack of stick and rudder skills during descent and landing:	
	1. Incorrect throttle setting	
	2. Failure to flare before touching down on runway	
	3. Too low for final approach	
	4. Too high for final approach	
	5. Missed approach	
	6. Multiple go arounds for landing	
	7. Failure to apply flaps appropriately	
	8. Bounce on landing	
	9. Failure to maintain appropriate heading	
	10. Failure to apply brakes appropriately	
	Lack of knowledge about kneeboard	
	Lack of knowledge about copilot tracking log	

Operational Decision Errors: Discretionary decisions not covered by regulations and procedures that unnecessarily increases risk.

	Demonstrated extreme maneuvers on approach	
	Chose to fly into adverse weather	
	Delayed response/slowed judgment	
	Poor professional judgment	

APPENDIX M
Continued

Outcomes of Flight

	Crash at destination airport
	Crash at alternate airport
	Crash at undetermined location
	Land at destination airport
	Land at alternate airport
	Land at undetermined location
	Beside or near runway
	On runway
	Number of approaches for landing

APPENDIX N: *Directions for Programming the Flight Scenarios*

Flight Scenario One: Instrument failure and bad weather

1. To load the flight

On the Flights menu click on Select Flight
Scroll down and click on Scenario One
Click on the green checkmark

2. To program the instrument failure

On the Aircraft menu, click System Failures
Click on Attitude Indicator and click the Armed box – set to fail in 8 to 15 minutes
When done, click on the green checkmark

The weather has been pre-programmed as follows:

On the World menu, click on Weather
Select Local
For each airport (indicated by four letters), set weather according to the information below
When done setting the weather, click on the green checkmark

KFFO
- Clouds: Few
- Precipitation: None
- Visibility: 30 miles
- Wind Strength: None

KMGY and KILN
- Clouds: Thunderstorms
- Precipitation: High
- Visibility: 1 mile
- Wind Strength: Severe

KHAO and KLUK (Cincinnati)
- Clouds: Thunderstorms
- Precipitation: Very high
- Visibility: ½ mile
- Wind Strength: Moderate

APPENDIX N
Continued

Flight Scenario Two: Low fuel and wind

1. To load the flight

On the Flights menu click on Select Flight
Scroll down and click on Scenario Two
Click on the green checkmark

The fuel amounts have been pre-programmed as follows:

On the Aircraft menu, click on Fuel
Change the left – gallons to 4 and the right – gallons to 3
Click on the green checkmark

The weather has been pre-programmed as follows:

On the World menu, click on Weather
Select Local
For each airport (indicated by four letters), set weather according to the information below
When done setting the weather, click on the green checkmark

K214
    Wind strength: Light
    Wind Direction: 249 degrees

KSGH
    Wind strength: Moderate
    Wind Direction: 249 degrees

KMGY
    Wind strength: Moderate
    Wind Direction: 249 degrees

APPENDIX O: *Descriptions of the Flight Scenarios*

Flight Scenario 1

Problems:

Instrument failure – Attitude indicator will fail approximately 5 to 8 minutes into the flight

Bad weather – weather at destination airport is so severe that only IFR (instrument flight rules) conditions are available, must land at an alternate airport

Only give weather advisories to the copilot

Pre-flight Briefing

Your mission is to fly a heart for an organ transplant from Springfield, Ohio to Cincinnati, Ohio. **It is imperative that you get to Cincinnati on time because the transplant team has already begun prepping the recipient and the heart is only viable for a limited amount of time. An ambulance will be waiting at Cincinnati. Any changes in the flight path will delay the heart's estimated arrival time at the hospital.** You will receive communications on a regular basis from Air Traffic Control (ATC) regarding your flight and weather conditions.

Please be aware that it is necessary that you maintain assigned airspeed, altitude, and heading within the following tolerances:

- +/- 200 ft. altitude
- +/- 10 KAIS airspeed
- +/- 20 degree heading

Captain/Pilot duties

- Fly the airplane – responsible for monitoring and maintaining altitude, attitudes, and airspeed
- Insuring safety of the mission
- Insuring completion of the mission
- Insuring the performance of the machine and crew

Navigator/Copilot duties

- Monitoring progress of route
- Communications from ATC
- Monitor weather along flight path and to destination
- Monitoring aircraft instruments and status
- Operate the landing gear

APPENDIX O
Continued

Script for ATC recording:
0:00 minutes

Flight #1234, this is ATC. Your flight plan has been filed and reads as follows:
Departing airport: (KSGH-6) Springfield, Ohio
Destination airport: (KLUK) Cincinnati, Ohio
Cruising airspeed: 100 knots
Distance: 51.6 nm
Heading: 214 degrees (SW)
Approximate arrival time: 35 minutes
Navigation method: Direct GPS
Fuel: 5 gallons (R), 5 gallons (L)
Pilot rating: **VFR (visual flight rules) – please be reminded that because you are not instrument rated, you cannot fly under IFR conditions.**
Cruising altitude: 4500 feet

Weather: Current conditions are as follows: broken clouds, low precipitation, visibility is at 10 miles, and winds are light. Flight under VFRules is advisable. Current weather conditions at the destination airport (KLUK – Cincinnati) are: Thunderstorms with high precipitation, visibility is reduced to ½ mile, and winds are severe. Weather advisories are issued approximately every 5 minutes

Remember to complete your copilot tracking log. You are cleared for take-off. Depart when ready.

5:00 minutes

Flight #1234 this is ATC. Current weather conditions are as follows: broken clouds, moderate precipitation, visibility is at 2 miles, and winds are moderate. VFRules are still in effect. Your current heading should be 214.

10:00 minutes

Flight #1234 this is ATC. Current weather conditions are as follows: overcast clouds, high precipitation, visibility is at 1 mile, and winds are severe. Weather conditions at destination airport are deteriorating. **Be advised that transferring to IFR conditions is possible and you may be unable to land at Cincinnati**.

15:00 minutes

Flight #1234 this is ATC. Current weather conditions are as follows: thunderstorms with high amounts of precipitation, visibility is at 1 mile, and winds are severe with heavy gusts. Weather conditions at destination airport continue to deteriorate.

Conditions at KLUK - Cincinnati are: Thunderstorms with high precipitation, visibility is reduced to 1/2 mile, and winds are severe. **Again, be advised that transferring to IFR conditions is probable. All pilots who are not instrument rated are urged to make alternate plans**.

APPENDIX O
Continued

20:00 minutes

Flight #1234, this is ATC. Current conditions are thunderstorms with very high amounts of precipitation and heavy winds. Visibility is currently ½ mile.

Current conditions at Cincinnati are: Thunderstorms with high precipitation, visibility is reduced to 1/2 mile, and winds are severe. **KLUK - Cincinnati Airport is advising pilots with VFR ratings to make alternate plans. Repeat, KLUK - Cincinnati Airport is advising pilots with VFR ratings to make alternate plans.**

25:00 minutes

Flight #1234, this is ATC. Current conditions are thunderstorms with very high amounts of precipitation and heavy winds. Visibility is currently ½ mile.

Current conditions at Cincinnati are: Thunderstorms with high precipitation, visibility is reduced to ¼ mile, and winds are severe. **KLUK - Cincinnati Airport is still advising VFR rated pilots to make alternate plans. Repeat, KLUK - Cincinnati Airport is advising pilots with VFR ratings to make alternate plans.**

This is your last weather update. Repeat, this is your last weather update.

Flight Scenario Two

Problems:

Pilot and copilot will receive conflicting headings, including one heading that will place their flight path into forbidden airspace.

Low fuel – barely enough fuel given to make it to destination airport.

Plane will be flying into the wind (wind will be blowing from Heading 250)

Copilot will be required to determine fuel consumption during flight to ensure they have enough fuel to land.

Pre-flight Briefing

Your mission is to fly medical supplies for flood victims from Columbus, Ohio to Dayton, Ohio. Because of the weight of the supplies, *the amount of fuel you can carry is limited.* You have just enough fuel to get to your destination given the current weather conditions. *Please be vigilant about watching fuel consumption.*

Be advised that your flight plan takes you within approximately 5 nautical miles of forbidden airspace on your left side near Wright-Patterson Air Force Base. It is extremely important that you follow ATC commands to avoid unauthorized entry into the airspace. Any attempt to deviate over or near the Air Force Base will result in severe penalties.

You will receive communications on a regular basis from Air Traffic Control (ATC) regarding your flight and weather conditions.

Please be aware that it is necessary that you maintain assigned airspeed, altitude, and heading within the following tolerances:

- +/- 200 ft. altitude

APPENDIX O
Continued

- +/- 10 KAIS airspeed
- +/- 20 degree heading

Captain/Pilot duties
- Fly the airplane – responsible for monitoring and maintaining altitude, attitudes, and airspeed
- Insuring safety of the mission
- Insuring completion of the mission
- Insuring the performance of the machine and crew

Navigator/Copilot duties
- Monitoring progress of route
- Communications from ATC
- Monitor weather along flight path and to destination
- Monitoring aircraft instruments and status
- Operate the landing gear

Script for ATC recording:
0:00 minutes

Flight #5678, this is ATC. Your flight plan has been filed and reads as follows:
Departing airport: Columbus Southwest (_04D-6) - Columbus, Ohio
Destination airport: Dayton-Wright Brothers (KMGY) - Dayton, Ohio

Again, be advised that your flight plan takes you within approximately 5 nm of forbidden airspace on your left side near Wright-Patterson Air Force Base. It is extremely important that you follow ATC commands to avoid unauthorized entry into the airspace. Any attempt to deviate over or near the Air Force Base will result in severe penalties.

Cruising airspeed: 100 knots
Distance: 51.7 nm
Heading: 252 (WSW)
Approximate arrival time: 35 minutes
Navigation method: Direct GPS

Pilot rating: VFR (visual flight rules) – please be reminded that because you are not instrument rated, you cannot fly under IFR conditions.

Cruising altitude: 4500 feet

Weather: Current conditions are scattered clouds, no precipitation, visibility is at 30 miles, and winds are light and from Southwest at Heading 240. Flight under VFRules is advisable. Weather conditions at the destination airport are currently: no clouds, no precipitation, 30-mile visibility, and moderate winds from the Southwest (Heading 255). Weather advisories are issued approximately every 5 minutes

Please remember to complete your copilot tracking log. You are cleared for take-off. Depart when ready.

APPENDIX O
Continued

0:05 minutes
Flight # 5678, this is ATC. Current weather conditions are scattered clouds, no precipitation, visibility is at 30 miles, and light winds continue from the Southwest at Heading 249. Your current heading should be 252.

0:08 minutes
**** Pilot's Headphones: Flight #5678, turn to Heading 310 now to avoid unauthorized entry of forbidden airspace.
****Copilot's Headphones: Flight #5678, turn to Heading 130 now to avoid unauthorized entry of forbidden airspace.

0:10 minutes
Flight # 5678, this is ATC. Current weather conditions are scattered clouds, no precipitation, visibility is at 30 miles, and winds are light. Your current heading should be 130 now.

0:15 minutes
Flight # 5678, you have cleared the forbidden airspace and may now turn towards Heading 240. When you intersect your original flight plan you may continue on track.
Current weather conditions are scattered clouds, no precipitation, visibility is at 30 miles, and winds are moderate from the southwest (Heading 245).

0:20 minutes
Flight # 5678, this is ATC. Current weather conditions are broken clouds, no precipitation, visibility is at 30 miles, and moderate winds are from the southwest (Heading 240).

0:25 minutes
Flight #5678, this is ATC. This is your final weather update. Conditions are currently as follows: broken clouds with no precipitation, 30-mile visibility, and moderate winds continue to blow from the southwest (Heading 250).
This is your last weather update. Repeat, this is your last weather update.

APPENDIX P: *Copilot Tracking Log*

This log is to be filled out every 5 minutes during the flight.

Time: _______
Altitude: _______
Attitude: _______
MP Gauge: _______
Fuel level: _______(R) ________(L)
Heading: _______
Vertical Speed Indicator: _______
Distance to Airport:_______

Weather
Clouds:_______
Precipitation:_____
Visibility:_________
Wind Strength:________
Wind Direction:________
Ground Speed:________
GPH: ________

Time: _______
Altitude: _______
Attitude: _______
MP Gauge: _______
Fuel level: _______(R) ________(L)
Heading: _______
Vertical Speed Indicator: _______
Distance to Airport:_______

Weather
Clouds:_______
Precipitation:_____
Visibility:_________
Wind Strength:________
Wind Direction:________
Ground Speed:________
GPH: ________

Time: _______
Altitude: _______
Attitude: _______
MP Gauge: _______
Fuel level: _______(R) ________(L)
Heading: _______
Vertical Speed Indicator: _______
Distance to Airport:_______

Weather
Clouds:_______
Precipitation:_____
Visibility:_________
Wind Strength:________
Wind Direction:________
Ground Speed:________
GPH: ________

Time: _______
Altitude: _______
Attitude: _______
MP Gauge: _______
Fuel level: _______(R) ________(L)
Heading: _______
Vertical Speed Indicator: _______
Distance to Airport:_______

Weather
Clouds:_______
Precipitation:_____
Visibility:_________
Wind Strength:________
Wind Direction:________
Ground Speed:________
GPH: ________

APPENDIX Q: *Kneeboard*

CESSNA 182S PROCEDURES BEFORE TAKEOFF

[ ] Parking Brake – SET
[ ] Fuel Quantity – CHECK
[ ] Fuel Selector Valve -- BOTH
[ ] Throttle -- 1800 RPM
[ ] Flaps -- SET for takeoff (0 degrees)
[ ] Brakes -- RELEASE

TAKEOFF

[ ] Throttle -- FULL
[ ] Elevator Control -- LIFT NOSE WHEEL (at 50-60 KIAS)
[ ] Climb Speed --
    70 KIAS (flaps 20 degrees)
    80 KIAS (flaps UP)

NORMAL CLIMB

[ ] Airspeed -- 85-95 KIAS
[ ] Throttle -- 23" MP or FULL (whichever is less)
[ ] Fuel Selector Valve -- BOTH

CRUISE

[ ] Throttle -- 15-23" MP
[ ] Elevator Trim – ADJUST
[ ] Rudder Trim -- ADJUST

DESCENT

[ ] Throttle -- AS DESIRED
[ ] Fuel Selector Valve -- BOTH
[ ] Flaps -- AS DESIRED
  0-10 degrees <140 KIAS
  10-20 degrees <120 KIAS
  FULL <100 KIAS

LANDING
[ ] Airspeed -- 70-80 KIAS
[ ] Flaps -- AS DESIRED
  0-10 degrees <140 KIAS
  10-20 degrees <120 KIAS

APPENDIX Q
Continued

FULL <100 KIAS
[ ] Airspeed -- 60-70 KIAS (flaps FULL)
[ ] Trim -- ADJUST as desired
[ ] Touchdown -- MAIN WHEELS FIRST
[ ] Landing Roll -- LOWER NOSE WHEEL GENTLY
[ ] Braking -- MINIMUM REQUIRED

AFTER LANDING

[ ] Flaps -- UP

SECURING AIRPLANE

[ ] Parking Brake -- SET
[ ] Throttle -- IDLE
[ ] Fuel Selector Valve -- LEFT or RIGHT to prevent crossfeeding